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THE IMPACT OF ENVIRONMENTAL FORCES ON ALBERTA COMMUNITY COLLEGES

1980-1990

by

© GAIL VALLANCE BARRINGTON

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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Date December 15 1980

TO MY MOTHER,

BERNICE VALLANCE,

WHOSE EXAMPLE AND LOVE

HAVE MEANT SO MUCH

ABSTRACT

The purpose of this study was to identify and explore some of the environmental forces likely to have an impact on the development of policy in the community colleges of Alberta during the period 1980-1990. Through the use of a policy Delphi format, the study polled two groups of postsecondary experts for three rounds of questionnaires. The two groups consisted of ten Alberta community college presidents and seven Alberta Advanced Education and Manpower senior officials with responsibilities in the area of community colleges. The questionnaires probed the topic in increasing degrees of specificity, moving from the identification of environmental forces to the rank ordering of major forces, to the impact of these forces on the colleges, to the influence of major forces on a particular policy decision area, and finally to the identification of possible college responses to these influences.

The major findings of the study revealed that political forces were perceived as the most prevalent in the community colleges' future environment but that economic forces were judged the most important, followed by political and demographic forces. Sixteen environmental forces were rated as being very significant in the next decade.

The projected impact of these forces was perceived as likely to be experienced as demands for flexibility and accountability. Twelve areas of college administration were deemed likely to be most affected by these impacts.

When the influrnce of 15 of the major environmental forces was examined in relation to policy development in the area of the sixteenth and most important of the forces, Technological Training and Retraining, six forces were rated as very influential. Demands for flexibility were determined as likely to have a greater impact than those for accountability. Four impact areas were identified as being very significantly affected by pressures for technological training.

Conclusions were drawn regarding the postsecondary environment of the eighties in thirteen different areas. Study findings also revealed that the two groups of respondents shared the same perspective of the future environment of Alberta's community colleges. In addition, the environmental theory on which the study was based was reexamined as was the future of the Delphi method. It was concluded that its future lay either in computerized versions of the technique or as a support methodology for other more specific analysis techniques.

Implications considered on the basis of the study's findings included the development of a series of five scenarios to demonstrate the principles of inventive planning. Twelve meta-policy propositions along with specific suggestions for action were proposed for discussion purposes among planners and policy makers. Finally two suggestions were made for further research in the areas of environmental control and inventive planning.

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Chapter I

INTRODUCTION

BACKGROUND TO THE PROBLEM

The turbulent environment which has characterized our society for the past thirty years shows every sign of accompanying us at least to the end of the century. Change has become the status quo. Organizations are beginning to develop ways to deal with uncertainty creatively, using change as an aid to organizational development. This can be accomplished by increasing an awareness of the environmental forces at work, projecting possible impacts of these forces on the organization, and interacting with the environment to influence the eventual results.

For postsecondary education, however, the environmental uncertainty of the sixties and early seventies was reassuring in that change was of a positive nature—it was synonymous with growth. But as Gilliland and Gilliland (1978:4) pointed out, successive states of increased resources are in fact transitional stages to a final steady state where resource input is constant or even declining. Public reception of postsecondary education has cooled and enrolments have levelled off or changed in their composition. The governmental stance is more structured and budgets have been curbed. Management strategies designed for unending growth are no longer appropriate yet the management of decline or of constant change is uncharted territory. All that is known for sure is that the old forms of planning will not suffice.

Patterson (1977:1) suggested that educators have been institution-bound in their planning process and recommended that "it would be wise for us to do our here-and-now planning with as much consciousness of the larger, changing societal context as we can achieve." Postsecondary planners and policy makers must examine the environment at large. What are the major forces which will affect the development of their institutions? What might the impact be? How can they interact with their environment to influence the outcome?

Planners are not only institution-bound, they are also constrained by the vast amount of quantitative data available. Somehow the advances in information-processing facilities have not been paralleled by improved decision-making skills. Planning has been limited to the degree that the future will consist of more of the present. The approach ignores the existence of the quantum leap, the flight of imagination which has enabled visionaries throughout time to ask, "What if?"

The solution is not, of course, to embark on a program of crystal ball gazing, although no fortune teller would underestimate the power of the self-fulfilling prophecy. But neither is it to continue planning in a completely prosaic, rational, quantitative vacuum in the face of the irrational realities which sustain our daily newspapers.

In order to conceive of a richer environmental context in which to consider future impacts, postsecondary planners must expand their methods to include not only quantitative extrapolation techniques, but also creative problem-solving approaches which incorporate the qualitative, judgemental, and even irrational elements of human thought.

The Delphi method uses such an approach. It permits the exploration of expert opinion in a given area in a sequential, iterative, and anonymous manner which encourages a freedom of thought and expression seldom found in regular group processes. This study attempted to employ this technique to allow experts to explore their opinions regarding the influence of environmental forces on post-secondary education in the next decade.

STATEMENT OF THE PROBLEM

The study sought to provide a pre-planning arena for free and creative discussion by postsecondary experts regarding possible impacts of environmental forces on Alberta community colleges during the next decade, and possible institutional responses in the area of policy making. In particular, the problem addressed can be stated as three major questions:

1. What environmental forces are viewed by postsecondary experts as likely to have a major impact on the development of Alberta community colleges in the eighties?

2. What impact do postsecondary experts perceive these major environmental forces as likely to have on the development of policy in Alberta community colleges in the eighties?

3. What meta-policy propositions can be derived from these perceptions?

A policy Delphi was conducted to obtain the answers to these questions. The panel consisted both of senior government officials whose work related to the college system and of the presidents of the Alberta community colleges. In addition to the problems stated above, three sub-problems of lesser significance were posed:

1. Are the views of the postsecondary experts similar regarding the identification of the major environmental forces?

2. Are the views of the postsecondary experts similar regarding the influence that these major environmental forces will have on policy development?

3. Is the Delphi method a useful research methodology for analyzing a complex issue such as this?

SIGNIFICANCE OF THE PROBLEM

The eighties are likely to be a watershed decade for the province of Alberta for a number of reasons. Economic power has begun to shift from east to west as the petrochemical and resource-extraction industries grow. Political power appears to be devolving to the provincial level and Alberta is elbowing Quebec and Ontario in its demand to be first among equals. With the solidification of the governmental position toward education, interorganizational relationships are strengthening. Alberta's population has risen sharply in the past ten years and is expected to continue to do so; meanwhile the median age is also rising. The communications industry has revolutionized distance education; it is simply up to the educators to learn to use the facilities available. As energy conservation becomes more important, our physical environment gains new respect. Job obsolescence and the continued influx of women into the workplace make new demands on postsecondary institutions. The rapid change occurring in every aspect of our environment makes appropriate planning critical to the survival of our present college system.

This study brought together senior governmental and institutional officials to consider their perceptions of major environmental forces affecting Alberta community colleges in the coming decade and to project possible impacts of these forces on the colleges. The policy Delphi method created a structured discussion format which maintained anonymity and encouraged reflection in a non-threatening atmosphere among colleagues and sometime adversaries. The method allowed in-depth exploration of the topic of environmental forces while remaining time and cost effective. The perceptions gained from the study have been compiled into a source document for postsecondary planners and policy makers. In addition, the study's findings have added to the body of research related to organizations and their environments and to the field of postsecondary education in Canada.

DEFINITIONS

Environment

Environment is defined as the groups, institutions, or social influences beyond the organization's boundaries ". . . which provide immediate inputs, exert significant pressure on decisions, or make use of the organization's output" (Tosi and Carroll, 1976:166).

Environmental Forces

Environmental forces are those general environmental conditions defined by Hall (1978:303-311) as technological, legal, political, economic, demographic, ecological, and cultural factors.

Impact

Impact is considered to be the effect on Alberta community colleges caused by change in general environmental conditions.

Development

Development is some form of institutional change relating to the impact of environmental forces.

Meta-policy Considerations

Meta-policy considerations are propositions or over-riding statements which should be taken into account in the policy-making process.

Alberta Community Colleges

The Alberta community colleges referred to in this study are the ten public colleges within the system of Alberta Advanced Education and Manpower.

The Eighties

The eighties are the years 1980 up to, but not including, 1990.

DELIMITATIONS AND LIMITATIONS

The study was delimited to the Alberta community college system and the panel consisted only of senior officials. The initial aspects of the environment under consideration were based on Hall's Typology although provision was made for the addition of further environmental forces as perceived by panel members.

Limitations to the study design included:

1. Stability of the panel was not guaranteed due to job changes.

2. As panel members were also colleagues or acquaintances, the possibility of outside discussion related to the study could not be controlled.

3. The meta-policy statements generated by the study were intended to serve only as considerations for policy makers to take into account when developing policy.

4. Interpretation of response data was limited to a single researcher and may have involved unconscious bias.

ORGANIZATION OF THE THESIS

The report which describes this study has been organized into seven chapters including this Introduction.

Chapter Two reviews the literature on organizations and their environments and provides the conceptual framework for this study. Environmental theories are examined which represent two basic approaches: (1) the organization-centered perspective, and (2) the environment-centered perspective. In the organization-centered section, systems theory is briefly overviewed, environmental theories reviewed, and types of organizational response to environmental change considered. In the environment-centered section, the causal texture of the environment is explored, followed by interorganizational relationships, environmental control, and finally a theory beyond causality. The section on the conceptual framework of this study outlines the theory of Emery and Trist (1969) regarding the causal texture of the environment upon which this study is based as well as the environmental typology by Hall (1972) used to structure the study. Other relevant theories are reviewed, including those by Seashore and Yuchtman (1968) and Van de Ven (1972).

Chapter Three describes the postsecondary setting in which this study was conducted. The new climate in which postsecondary education finds itself is related to the loss of institutional autonomy, the new student population, and the demand for new types of programs. Each of these causes is reviewed in turn. Then a variety of postsecondary responses to environmental uncertainty is discussed, from both organization-centered and environment-centered perspectives. Finally the Alberta postsecondary scene is described, both past and future.

Chapter Four outlines the methodological framework of the study. The Delphi method is overviewed through a definition of it, a description of its characteristics and a brief look at its history and future. The section on methodological issues reviews the advantages and disadvantages of the method. A section devoted to a particular form of Delphi study, the policy Delphi, which is employed in this study, explains its special characteristics and describes a study which provided a model for the present study. The next section reviews some Delphi studies conducted in the field of postsecondary education with particular reference to some Alberta studies, two of which provided useful information for the present study's design. A final section itemizes specific methodological features and limitations of the present study.

Chapter Five outlines the research design and research procedures employed in this study. The section devoted to research design includes the statement of the problem and sub-problems, the focus of the study, research variables used in the study, and panel selection and characteristics. The section devoted to research procedures includes instrument development, data collection procedures, and data analysis procedures. This section addresses each topic in turn for each of the three rounds of the study.

Chapter Six provides a description of the data generated by the study and an analysis of these data. Each round of the study is examined sequentially by the presentation of an overview of the purpose of the study, a brief description of the questionnaire, a description of the data generated, and an analysis of the findings. In addition, two of the study's sub-problems, related to group differences, are examined in relation to Round II and Round III of the study in turn. Finally, the Specific, Additional, and General Comments appended by panelists to their questionnaires are analyzed.

Chapter Seven contains a summary of the study and draws some conclusions and implications based on the research findings. The summary reviews the purpose and problems of the study, its focus, justification, and conceptual and methodological frameworks. Instrument development and data collection and analysis procedures are described. The major findings of the study are reviewed.

Conclusions drawn from the study relate to a number of different areas in the postsecondary environment. The environmental theory on which the study was based is reviewed as is the future of the Delphi method. Finally, some implications of the study's findings are advanced in the form of several scenarios, some meta-policy propositions and specific suggestions for action are suggested, and future research areas considered.

SUMMARY

This introductory chapter has reviewed the background of the problem, outlined the problem and sub-problem statements, identified the significance of the problem, provided some definitions, described the study's delimitations and limitations, and overviewed the organization of the thesis.

The next chapter will examine relevant organization theory in a detailed review of the literature and will also provide the conceptual framework of the study.

Chapter II

REVIEW OF THE LITERATURE AND CONCEPTUAL FRAMEWORK

The major portion of this chapter is devoted to a comprehensive review of organization theory developed over the past twenty years in the area of organizations and their environments. The review has disclosed two basically different perspectives of organizations and their environments: one is organization-centered; the other is environment-centered. Then a final section of the chapter reexamines briefly the theories which are pertinent to the conceptual framework of this study.

REVIEW OF THE LITERATURE

"Organizations are inescapably bound up with the conditions of their environment." This recent statement by Pfeffer and Salancik (1978:1) depicts the current environmental perspective found in organizational literature. However, a review of the body of theory and research associated with organizations and their environment reveals that this was not always the case. In fact the literature breaks down into two major categories. The first is an organization-centered perspective in which organizations may choose to react to environmental change. The second is an environment-centered perspective in which organizations concentrate on interacting with their environments and even manipulating them. We have moved from what was basically a closed, mechanistic, rational view of organizations and their environments to an open, organic, sometimes irrational view. This review of organization literature deals with each category in turn.

The Organization-Centered Perspective

Systems Theory

The environmental literature is an outgrowth of systems theory. Von Bertalanffy (1962:7) first proposed his General System Theory in 1947 viewing related systems as an entity rather than isolating particular phenomena out of those systems for closer scrutiny. This theory gave rise to interdisciplinary research generating a flow of ideas from biology and the hard sciences to administration and the social sciences. One of the main principles of the theory was that of openness and closedness. In biological terms, von Bertalanffy defined an open system as attaining ". . . a steady state in which its composition remains constant, but in contrast to conventional equilibria, this constancy is maintained by a continuous exchange and flow of component material" (1962:14).

Tosi and Carroll (1976:156) applied systems theory to the study of organizations and developed their definition of system as ". . . a set of interrelated components surrounded by a boundary which absorbs inputs from other systems and transforms them into outputs that serve a function in other systems." These components or subsystems were further divided into primary subsystems, consisting of the production, adaptation, and boundary-spanning functions, and collateral systems, involving maintenance and management.

A system could be open or closed, depending on environmental conditions. According to Thompson (1967:4), a closed system operated in a fixed situation where all environmental variables were predictable, but an open system (1967:6) dealt with an environment subject to unknown influences. Mott (1972:6-7), however, maintained that closure was a variable concept with organizations always retaining some degree of closure.

Michael's more environmental perspective (1973:113) supported an approach that was all encompassing:

> The closed-system strategy seeks certainty by incorporating only those variables positively associated with goal achievement and subjecting them to a monolithic control network. The open-system strategy shifts attention from goal achievement to survival, and incorporates uncertainty by recognizing organizational interdependence with environment. A newer tradition enables us to conceive of the organization as an open system, indeterminate and faced with uncertainty, but subject to criteria of rationality and hence needing certainty.

The general instability of present environmental forces led Meyer (1978:18) to declare that the systems controversy was over—all organizations had to be open systems to survive.

Environmental Theory

The growing realization of the environment's influence on the organization led to a spate of descriptors and typologies in an attempt to define its elusive nature.

March and Simon (1958) suggested that an environment could be hostile or benign, Dill (1958), that it could be homogeneous or heterogeneous, stable or rapidly shifting, unified or segmented. Coleman (1957) considered organizational density or the degree of population and resource concentration, Emery and Trist (1965) environmental turbulence, Aiken and Hage (1968) environmental capacity or the ability of the environment to provide required resoures, and Levine and White (1961) domain consensus or the degree to which an organization's claim to its environment was disputed. Aldrich (1975) placed seven environmental descriptors on a series of continua (1975:57-61) to facilitate the conceptualization of an organization's environment. Pfeffer and Salancik (1978:68) suggested that the three most important environmental characteristics were density, capacity, and interconnectedness, or the number and pattern of linkages among organizations. These determined the degree of conflict and interdependence which was confronted by an organization.

Hall (1972:304-311) summarized environmental conditions as general and specific. The general environment included technological, legal, political, economic, demographic, ecological, and cultural factors; while the specific environment included both organizations and individuals directly involved with the focal organization.

Duncan (1972) studied the components and dimensions of environmental uncertainty as perceived by members of three manufacturing and three research and development organizations. He identified three components of uncertainty (1972:318):

1) the lack of information regarding the environmental factors associated with a given decision-making situation,
2) the lack of knowledge about the outcome of a specific decision in terms of how much the organization would lose if the decision were incorrect, and
3) the inability to assign probabilities with any degree of confidence with regard to how environmental factors are going to affect the success or failure of the decision unit in performing its function.

He proposed two dimensions for the study of environmental uncertainty: the simple-complex dimension or "the number of factors taken into consideration in decision making" (1972:325), and the static-dynamic dimension or "the degree to which the factors in the decision unit's environment remain basically the same over time or are in a continual process of change." A simple-complex environmental index was developed by multiplying the number of decision factors identified by decision unit members by the number of components they had identified in the environment. A static-dynamic index was found by adding the unit's average scores for frequency of new factors in the decision-making process with the number of new factors to be considered. Duncan's findings showed that the static-dynamic dimension was a more important contributor to environmental uncertainty than the simple-complex dimension. He also noted that the incidence of environmental uncertainty varied according to the tolerance of the perceiver for ambiguity.

Organizational Response to Environmental Change

In an early study of organizational response to environmental demands, Dill (1958) examined the reactions of two Norwegian firms to relatively similar environmental conditions of scarce resources and increased competition. He found that Beta, an engineering firm, had adjusted more successfully to environmental instability than Alpha, a clothing manufacturer, in part because Beta's managers had more autonomy (1958:435). Out of Dill's study came the useful definition of the task environment as "the stimuli to which an organization is exposed" (1958:411).

In 1961, Burns and Stalker studied the effects of the rate of technological change and the introduction of research and development groups on the management system of several English and Scottish electronics firms (1961:5). They discovered two clearly divergent management practices which they labelled mechanistic and organic.

In the mechanistic approach, problems were dealt with separately from the regular work situation. Technical methods and roles were precisely defined, interaction was vertical and the belief was held that only the firm head understood the total operation. This approach seemed more appropriate in stable environmental conditions. On the other hand, the organic approach seemed more appropriate in the face of a dynamic environment. Problems or special tasks were handled by the firm as a whole, jobs were continually redefined due to interaction, communication was lateral as well as vertical, and the firm head was not considered omniscient.

Most of the Scottish firms, which tended to be mechanistic, failed to meet their goals and in several cases, the research and development groups were disbanded altogether. In contrast, several English firms responded to the changing technology in an organic fashion (1961:8), regarding change as a circumstance which affected every part of the firm and everyone's job.

In 1967, Lawrence and Lorsch studied the effects of economic and technological change in three different types of organizations: the plastics, container, and food industries. The major concepts which they introduced to the study of environment in organizational theory were differentiation and integration. Differentiation was viewed as the differences in attitude and behavior among managers in their orientation to organizational goals (1967:9). Integration was defined as ". . . the quality of the state of collaboration that exists among departments that are treated to achieve unity of effort by the demands of the environment" (1967:11).

In studying the relationship of the organizations' differentiation and integrative studies in their effectiveness in dealing with the environment, they discovered that the two concepts were inversely related (1967:157):

> The more differentiated an organization, the more difficult it is to achieve integration. To overcome this problem, the effective organization has integrating devices consistent with the diversity of the environment. The more diverse the environment, and the more differentiated the organization, the more elaborate the integrating devices.

The plastics industry, operating in the most volatile environment, had the most elaborate set of integrative devices and also relied the most heavily on interpersonal contact. The container industry, operating in the most stable environment, relied on its managerial hierarchy and its paper system with only some direct contact. Effective firms in both industries were coping with the types of environmental demands they faced.

Emery (1967:225-227) predicted that the next thirty years would evolve around man's attempts to adapt to turbulent environments, simplifying the complex through forms of symbolic reductionism: "If the environment is over-complex then down-grade complexity, by segmentation, fractionation or dissociation." Segmentation meant to restrict the range of conditions to which one responded. Fragmentation implied a disintegration of the social system into parts which pursued their own ends without regard for the total system. Dissociation involved acting without taking possible outcomes into account. Emery (1978:228) concluded that the three defense mechanisms sapped the energy of the system and reduced its further adaptiveness.

Thompson (1967) developed some propositions regarding organizational responses to environmental uncertainty to protect the technological core. These included buffering techniques such as stockpiling and preventive maintenance, leveling environmental fluctuations, forecasting and adapting to demand patterns, and rationing supplies and energies (1967:20-23). When the technological core could no longer be protected from the constraints placed on it by a changing environment, Thompson (1967:78) suggested that organizations began to exert more rigorous control over the areas that were predictable, leading to increased rigidity or routinization. This tightened structure could be achieved by three forms of subsystem coordination (1967:56): pooled interdependence which meant that each unit rendered a discrete contribution to the whole and was supported by it; sequential interdependence which was a serial form of pooled interdependence appropriate to more dynamic situations; and reciprocal interdependence which was a form of coordination by mutual adjustment, each unit's activities contingent on the others. While reciprocally interdependent subsystems were the most responsive to change, they were also the most costly, not only financially, but in terms of communication and decision-making skills. Therefore, organizations were more likely to rely on pooled interdependence even when not effective. However, when the environment became too heterogeneous and dynamic, the organization sought to establish units whose prime function was to interpret the environment to the organization, or to act as boundary spanners (1968:70). As internal coping solutions became less effective, the boundary-spanning subsystem gained importance, and as the environment became more complex, the subsystem had to differentiate in order to monitor its changing components.

Michael (1973:200) explored a major problem encountered in the boundary-spanning process. The turbulent environment caused boundaries to shift and functions of task groups to change. Inevitably the sentient (personal-need-fulfilling) groups were also disrupted at a time when personal security was uppermost. Conflict then arose between the need for secure personal relationships and the environmental demands for change. The feedback from the environment, essential to change, was therefore frequently avoided to reduce anxiety and appropriate planning became impossible.

Khandwalla (1972) developed a series of propositions about the effect of three environmental properties on organizations: (1) uncertainty, (2) heterogeneity, and (3) malevolence. He suggested that uncertainty and heterogeneity elicited similar responses from the organization such as decentralization, divisionalization, boundary spanning, and participative management, but that malevolence resulted in greater integration, coordination and centralization of authority. Leifer and Huber's 1977 study viewed the relationship of boundary-spanning activities to organizational structure and perceived environmental uncertainty in twelve health and welfare work units. Their conclusion was that boundary spanning was an intervening variable between perceived uncertainty and organizational structure (1977:235). Van de Ven (1976:308) suggested that as the task of boundary spanning became more demanding, it tended to encroach on organizational members' private lives leaving them less and less time when they were not acting as representatives of the organization.

The Environment-Centered Perspective

The Causal Texture of the Environment

Emery and Trist (1969) developed a broader perspective by concentrating on the causal texture of the environment itself wherein environmental processes interacted with each other, apart from the organization, yet knowledge of this interaction might be vital to organizational survival. They identified four types of environments (1969:222-224): (1) the placid randomized environment where forces were random and unchanging; (2) the placid clustered environment where certain forces linked together in certain ways; (3) the disturbed-reactive environment where competition among organizations existed; and (4) the turbulent environment where dynamic properties arose from the field itself and interacted to create significant changes in the environment.

According to Michael (1973:27), the Type 3 environment is the one within which organizations have operated for the last two hundred years where transactions with the environment were conducted by hierarchically structured organizations. Emery (1967:221) indicated that the competition in which an organization participated resulted in a certain amount of interaction with that environment:

> That part of the environment to which it wishes to move is probably, for the same reason, the part to which the other wants to move. Knowing this, they will wish to improve their own chances by hindering the other, and they will know that the other will not only wish to do likewise, but will know that they know this. In a word, the presence of others will imbricate some

> of the causal strands of the environment. The causal texture of the environment will, through the reactions of others, be partly determined by the intentions of the acting organization.

Emery and Trist argued that the Type 4 or turbulent environment was that of present-day society. The emergence of such complex and interactive field forces made organizational response difficult. Three trends contributing to the turbulent field forces were the competitive action of the disturbed-reactive environment, deepening interdependence between facets of society, and constant technological change (1960:224). Michael (1973:29) asked the critical question:

> Is it reasonable to expect that our Type 4 environment is so autonomous and unanticipatable that there really is very little reason to hope that actions taken in the present can be guided and revised by learning about the environment through lrsp [long range social planning]?

Terreberry (1968) combined the ideas of Emery and Trist with a touch of Darwinism to hypothesize that environments evolved and exerted selective pressure on organizations, so that only the fittest survived. The corollary to her hypothesis was that organizations which did survive had learned to adapt to environmental contingencies and therefore organizational change was largely externally induced (1968:610-611).

Interorganizational Relationships

Evan (1962) identified the concept of dependency inherent in any relationship between the organization and its environment (1962:175). He adapted Merton's role-set concept used to analyze role relationships to organizations, defining the organization-set as the interaction of an organization with the network of organizations in its environment (1962:178). He hypothesized that the higher the concentration of input organizational resources in the organization-set, the lower the degree of autonomy in the focal organization; and the greater the size of the organization-set and the likelihood of an uncooperative coalition controlling resources, the lower the autonomy of the focal organization (1962:180-181). An important environmental concept offered by Levine and White (1961) was that of the organizational domain which identified ". . . the points at which the organization is dependent on the environment" (Thompson, 1967:27).

Thompson and McEwen (1958) postulated that any change in an organization's relationship with its environment required a concurrent alteration in organizational goals or their interpretation. Thus in an unstable environment, reappraisal of goals became a recurrent problem (1958:24). The organization's degree of prosperity was determined by its agility at adaptation. Among the strategies an organization could use to come to terms with its environment were competition with other firms in its organization-set, bargaining for resources, goods or services, co-optation or the absorption of threatening environmental elements into its system, and coalition, whereby two or more organizations joined for a common purpose (1958: 26-28).

Pfeffer and Salancik (1978:189) also suggested that organizational interaction with the environment could include diversification, growth, cooptation, and the merger or total absorption of the environment. Bennis (1974:23) stressed the need to "identify new roles for linking and correlating interorganizational transactions." Pinfield et al. (1974:90) suggested developing confederations of small organizations to achieve viability. They also proposed the concept of the organizational broker (1974:94), "an indigenous local organization which mediates relations between an organization and its environment," with knowledge of local conditions and access to local resources. It could perform the boundary-spanning function more economically than could the organization.

The collaboration and competition resulting from interorganizational relationships were viewed by Michael (1974:207) as being either constructive or destructive to change efforts. Information would be more economically available if pooled but the dependence which would develop could reduce autonomy. However, a sufficiently turbulent environment would force participants to overcome suspicion and hostility to ". . . share the social psychological burdens of coping with error, turbulence, and uncertainty with other organizations."

Van de Ven suggested that only two reasons were compelling enough to forfeit some autonomy and invest in developing an interorganizational relationship: (1) the internal need for resources, or (2) the commitment to some external need or opportunity (1976: 305-306). Hall added a third reason: the requirement to interact by law (1978:303).

Aiken and Hage (1968) studied the interorganizational relationships of sixteen social welfare and health organizations to determine if the interdependence resulting from joint programming was related to intra-organizational characteristics. They found that organizations with more joint programs tended to be more complex, more innovative, more decentralized, and had better communication channels (1968:912). Osborn and Hunt (1974) studied the relationship of the task environment complexity variables of risk, dependency, and interorganizational relationships with organizational effectiveness in twenty-six small, rigidly-structured state social service agencies. The only relationships which were significant were that task environment dependency and interorganizational interaction alone and in combination were positively and significantly related to effectiveness (1974:240-241).

To develop an interorganizational relationship over resource interdependence, Van de Ven (1976) indicated that two prerequisites should exist: first, the organizations' boundary spanners had to be aware of possible resources in other firms; and secondly, there had to be consensus as to the goals each organization was serving (1976: 308). An interesting case study by Sebring (1977) highlighted the need for goal congruence. The attempt of a large state university and a state department of welfare to collaborate on a five-million dollar series of projects collapsed in conflict and bitterness. Sebring traced the source of the problem to the fact that each organization existed in a distinctly different environment which gave rise to different managerial and staff orientations and different goals, structures, reward systems, and time orientations (1977:520). A deliberate and systematic review of how each institution's environmental pressures and organizational structure would affect their relationship should have been conducted prior to involvement in the joint venture.

Van de Ven (1976:310) also suggested that for interorganizational relationships to be successful, a certain degree of domain similarity had to exist—too much would induce severe competition, too little would block communication. He hypothesized a curvilinear relationship between domain similarity and the potential for interorganizational relationships. Despite the limited success of interorganizational linkages to date, Van de Ven indicated that if short-term relationships were perceived as both equitable and productive, organizations could become ". . . meshed together in a web of interdependencies" (1976:311) in their attempts to combat environmental uncertainty.

Environmental Control

Aldrich's seventh environmental dimension was mutability, ". . . the extent to which the environment is open to manipulation and change by means of organizational activities" (1975:61). The mutability of the environment depended on the adequacy and appropriateness of the tactics employed by the organization to change its situation.

Attempts by the organization to control its environment were generally related to resource acquisition which Benson (1975:232) interpreted as either money or authority. After their longitudinal study of seventy-five insurance sales agencies, Seashore and Yuchtman (1968:393) concluded that organizational effectiveness could be defined as the ability of an organization ". . . to exploit its environment in the acquisition of scarce and valued resources to sustain its functioning." When Kimberley (1975:6) studied sheltered workshops and their orientations to either rehabilitation or production, he found a strong relationship between program orientation relative to government orientation and the degree of income from grants. He concluded that an important strategy for dealing with environmental uncertainty was to heighten organizational visibility to individuals and agencies controlling essential resources (1975:8). Similarly, in a study by Pfeffer in 1973 (Pfeffer and Salancik, 1978:174), hospitals were found to have grown ". . . to the extent that they had political connections, financial institution representation, and a board composition that was appropriate to the agricultural or manufacturing character of the area."

A broader view of environmental control was seen by Hirsch (1975:332) in his study of the effectiveness of the pharmaceutical and phonograph industries in coping with their turbulent environments. The pharmaceutical industry's overriding success was due to its managers' ability to anticipate market uncertainties, to influence legislation, and to coopt the medical profession (1975:333-339). Its high profits were a result of its ability to manipulate and control its environment, while the phonograph industry languished from a continued misreading of environmental forces.

Benson suggested strategies for change at the organizational network level including cooperative, disruptive, manipulative, and authoritative strategies or a combination of the above (1975:242-246); the selection of an appropriate strategy was dependent on the concentration of resources, power, and autonomy (1975:240).

A less optimistic view of organization-environmental relations was recently adopted by Pfeffer and Salancik (1978:2) who viewed organizations from a resource-dependent perspective:

> Our position is that organizations survive to the extent that they are effective. Their effectiveness derives from the management of demands, particularly the demands of interest groups upon which the organizations depend for resources and support.

Aldrich (1979:27) also took a resource-dependent stance. He proposed a general model of organizational change based on the natural selection concepts of variation, selection and retention. The major weakness with this approach is its retrospective, descriptive nature, constructing rationales for changes which have already occurred (1979: 51). Aldrich did not provide organizations with tools for combating the present or moulding the future, whereas Pfeffer and Salancik viewed environmental uncertainty as providing management with one of its major functions (1978:18): ". . . to guide and control this process of manipulating the environment."

According to Pfeffer and Salancik (1978:26), an organization could only survive by maintaining a coalition of interest groups which contributed the resources and support necessary for it to continue its activities. They suggested strategies to forestall a loss of autonomy and balance external demands such as: (1) sequential attention to the demands of various interest groups; (2) nondisclosure of what each group was doing to the others; and (3) playing one group off against another (1978:96). More effective environmental control could be maintained by avoiding compliance situations altogether. To exercise organizational influence, they suggested four strategies (1978:98-102): (1) control of access to communication channels;

(2) control of the definition of satisfaction; (3) control of the formation of demands through self-regulation, standard-setting, and advertising; and (4) control of discretionary behavior such as visibility.

For the most part, Pfeffer and Salancik's perspective of environment was limited to that of interest groups, organizations, and interorganizational networks. They did not consider the roles general environmental trends or specific events might play in organizational survival. The resource-dependent approach is topical and fresh at the present time but it is likely to be surpassed by more complex theories of organizational motivation in the future.

Beyond Causality

In planning for the future it is simplistic to assume a linear cause-effect relationship. There are too many variables and too many unknowns interacting with each other with their interactions spawning their own chains of events to view the environment as anything other than unpredictable. As Toffler (1980:323) recently observed:

> The Third Wave causality that is gradually taking shape pictures a complex world of mutually interacting forces, a world filled with astonishment, with change amplifiers as well as reducers and many other elements as well—not just billiard balls clacking predictably and endlessly against one another on the cosmic pool table.

Conditions of information overload and ambiguity become the norm and the either/or trap loses its spring.

For organization members to involve themselves in productive future-responsive planning, Michael (1978:18) suggests that they learn to do these six things:

1. Live with and acknowledge great uncertainty.
2. Embrace error.
3. Seek and accept the ethical responsibility and the conflict-laden interpersonal circumstances that attend goal-setting.
4. Evaluate the present in the light of anticipated futures, and commit themselves to actions in the present intended to respond to such long-range anticipations.
5. Live with role stress and forego the satisfactions of stable, on-the-job social group relationships.
6. Be open to changes in commitments and direction, as suggested by changes in the conjectured picture of the future and by evaluations of on-going activities.

He suggested that by acknowledging the fragmented and uncertain data base upon which plans must be made, purely rational planning models become "ridiculous and fraudulent" (1973:150):

> But if goal choices are not restricted to criteria based solely on data, theory, and so forth, then the door opens for preferences, values, ideologies, and the feelings that underlie them, to become a major and explicit part of the goal-setting process.

March and Olsen (1976:18) also called for an organizational theory that recognized "only a modest connection between environmental response and organizational decision." They outlined four types of organizational ambiguity (1976:12): (1) ambiguity of intent, or ill-defined objectives; (2) ambiguity of understanding, or lack of connection between organizational actions and their consequences; (3) ambiguity of history, or differing reconstructions of the past; and (4) ambiguity of organization, or varying degrees of attention and participation. Their garbage can theory of organizational choice moved outward from the organization to even incorporate action and events in the environment which had little or no connection (1976:17):

> Environmental acts frequently have to be understood in terms of relationships among events, actors, and structures in the environment, not as responses to what the organization does. As a result, the same organizational action will have different responses at different times; different organizational actions will have the same response. The world of the absurd is sometimes more relevant for our understanding of organizational phenomena than is the idea of a tight connection between action and response.

Summary

The review of organization-centered theory dealt briefly with systems theory and then outlined the many descriptors of the environment which emerged in an attempt to define it. Then the concept of environmental uncertainty was examined. Finally, organizational response to environmental change was explored through the work of such theorists as Dill (1958), Emery (1967), Thompson (1967), and Michael (1973) and such researchers as Burns and Stalker (1961), Lawrence and Lorsch (1967), and Leifer and Huber (1977). The review of environmental-centered theory examined Emery and Trist's (1969) theory of causal texture in some detail. Next interorganizational relationships were discussed with emphasis on the work of Thompson and McEwen (1958) and Van de Ven (1976). The environmental control of the environment was explored with theories of Salancik and Pfeffer (1978) outlined in some detail. Studies conducted by Kimberley (1975), Hirsch (1975) and Pfeffer (1973) added support to the theories proposed. A final section dealt briefly with a theory which looks beyond causality suggested by March and Olsen (1976).

This review of the literature on organizations and their environments spans a twenty-year period. During that time theories have changed from organization-centered to environment-centered, from reactive to interactive. Organizations are no longer described as independent, closed, mechanistic and rational but instead are interdependent, open, organic and frequently irrational. The environment is no longer labelled with a series of black-and-white descriptors, it is simply assumed to be turbulent and complex on a permanent basis. We have moved from a graded list of organizational responses to increasingly threatening environments, to a rather insecure and equivocal position—it is uncertain whether any organizational response to any environmental condition will result in the desired change.

CONCEPTUAL FRAMEWORK

The Causal Texture of the Environment and Environmental Forces

The conceptual framework for this study was derived from an environment-centered perspective, based in particular on the concepts of causal texture and environmental turbulence proposed by Emery and Trist (1969). Knowledge regarding the interaction of environmental processes with each other was vital to organizational survival. Emery and Trist argued that their Type 4 turbulent environment was evident today. In such a setting dynamic properties of the environment interacted with each other to create significant changes in that environment.

In addition, a specific conceptual tool was provided by Hall's Typology (1972). Hall summarized general environmental conditions into seven factors: technological, legal, political, economic, demographic, ecological, and cultural.

It was therefore proposed that this study would attempt to first identify and then examine environmental forces and their interaction with particular reference to the community college system in Alberta during the next decade.

Resource Dependence, Loss of Autonomy, and Interorganizational Relationships

Seashore and Yuchtman (1968) suggested that the success of an organization depended on its ability to acquire scarce resources. This theory was supported by Van de Ven (1976) who added that in order to acquire those resources, some loss of institutional autonomy was likely.

From a knowledge of the history of community colleges in Alberta (see Chapter III), it was judged that some relationship between resource dependence and loss of autonomy might be observed.

In addition, Van de Ven suggested that resource dependence would also result in the development of interorganizational relationships. Therefore it was determined that study results would be reviewed to see if such a connection existed.

Summary

The conceptual framework for this study was based in part on the environmental theory of Emery and Trist (1969) regarding causal texture. This framework was applied to the community college setting in Alberta during the next decade. The typology of environmental factors or forces suggested by Hall (1972) provided a useful structure through which to examine the interactive nature of forces.

Also the theories of Seashore and Yuchtman (1968) and Van de Ven

(1972) were utilized to discover if relationships did exist between resource dependence and loss of autonomy, and resource dependence and interorganizational relationships.

SUMMARY

This chapter has reviewed the theoretical background behind the present study of environmental forces and Alberta community colleges. The first section provided an in-depth literature review, dividing theorists and researchers into two basic categories: those with organization-centered perspectives; and those with environment-centered perspectives. The present study would belong to the second category. The second section of the chapter outlined the conceptual framework of this study, summarizing the theories on which it was based.

The next chapter presents an overview of the postsecondary setting in which this study was conducted.

CHAPTER III

THE POSTSECONDARY SETTING

Before the relationship between postsecondary institutions and their environment can be examined, the environment itself must be explored. The climate of change in which postsecondary education finds itself, the loss of institutional autonomy, the new student population, and the demands for new types of programs will be described. Next, a variety of postsecondary organizational responses will be discussed, from organization-centered and environment-centered responses to environmental control. Then the need for improved educational planning will be considered. Finally, the Alberta scene will be reviewed from both historical and future-oriented perspectives and the purpose of this study placed in context.

THE NEW CLIMATE

A Period of Change

It is generally conceded that in the medium- to short-term view, postsecondary education must be willing to acknowledge a colder public reception and a more restrictive governmental stance than was their wont in the past. An attitude survey conducted by Harris (Yankelovich and Lefkowitz, 1980:9) found that public confidence in higher education had changed from 61% in 1966 to 33% in 1979.

According to Culbertson (1976:253), the shift in public attitude away from faith in education as a social panacea had weakened by the beginning of the seventies:

> The high aspirations projected for education as an instrument for solving societal problems had been visibly shaken. Skepticism about the power of education increased as aspirations declined. In addition, marked changes in the patterns of economic and population growth began to develop. The seeds of adversity for educational and other societal leaders, which were sown in the previous decade, were beginning to bear fruit. New conditions for education and its leadership were the results.

Martorana and Kuhns (1975:2) indicated that fundamental shifts in public attitudes, financial support, student enrollment and operating procedures would have major ramifications for postsecondary education. Among the factors creating demands for change, they included (1975:3-5): (1) rising expectations; (2) public disenchantment; (3) pressure for accountability; (4) competition for students and dollars; (5) a different student body; (6) student demands for flexibility; (7) concern for affective-learning values; (8) developments in technology; and (9) the shift to a buyer's market. Dennison (1979) listed three major issues facing postsecondary education in western Canada in the eighties: the erosion of public confidence, escalating costs, and a diminishing pool of potential students.

During the decade of the seventies, many American colleges experienced a crisis in financing, leading to the belief that there was a decline or "new depression" in postsecondary education (Cheit, 1971). The change demanded a new set of managerial skills as Sussman (1978:40-41) indicated. Fresh from his experience at a battered New York City Community College, he admitted, "The creative management of reduction is a different and far more exacting task than creative leadership in a period of expansion." But de Cosmo (1978:46) suggested that the management of decline was frequently inept and short-sighted. As discretionary expenditure became limited, program quality could deteriorate, enrolment soften, course offerings retrench, and further decline ensue.

In Britain, shifting demographics necessitated the closure of two-thirds of the teacher training colleges. Again new managerial styles were required to deal with the changing environment, but Taylor (1979:21-22) reported that rather than initiate action, organizations tended to take a wait-and-see attitude until it was too late. He also suggested (1979:26) that contraction such as they had experienced could lead to defensiveness, heightened reliance on standards, and suspicion about the value of investing time and money in any real attempts to change.

In Canada no such violent changes have been experienced. Nevertheless, today's postsecondary environment is considerably different than it was a decade ago. As a new phenomenon in the late sixties and early seventies, community colleges grew at a rate that would become impossible to sustain. The levelling off of traditional components of the colleges in recent years could be confused with decline but actually nothing could be further from the truth. Canadian colleges are healthy; they are simply changing into different institutions from those envisioned a decade ago. A down-turn in the economy along with changing public expectations and different government attitudes has created a different environment and hence, different institutions. One particularly influential factor has been the loss of autonomy experienced by the colleges.

The Loss of Autonomy

The basic reason for the loss of institutional autonomy is resource dependence. As governmental support increases, so does governmental desire for control and coordination. As Cohen et al. (1975:ix) commented:

> Gradually, steadily, seemingly irresistably, government agencies, commissions, boards, and legislatures are impinging on the colleges. All is done with the best of intentions: program duplication among colleges in the same region must be avoided, data must be reported uniformly, minimum standards for programs and personnel must be maintained.

Frey (1977:107) maintained that government intervention until recently had remained at the operating level but that it was beginning to make inroads at the strategic level: "Up to this point academic freedom has not been constrained directly, but the potential for such constriction does exist." The benefits of governmental control generally cited included stable funding, coordination of programs, and institutional upgrading through the setting of minimal standards while dangers included homogenization, ". . . a breakdown in local control and consequent unresponsiveness to the community, and a general tendency toward bureaucratization or institutionalization that diminishes individuality" (Cohen et al., 1975:9). As shall be seen, the issue of autonomy has been of particular importance to Alberta community colleges where local control and responsiveness have been highly valued.

Another factor which has brought about change in the post-secondary climate is the new breed of student.

The New Student Population

An interesting dilemma for postsecondary education has been that while economic restrictions and governmental intervention have threatened to curtail its growth, social forces elsewhere have been creating a new pool of nontraditional, potential postsecondary students. Larsen (1979:9) identified the forces as those of technology and human rights. Technology's demand for special training appeared unlimited as "in a technological society old occupations obsolesce and new ones open up making second and third careers a frequent phenomenon." The second force was the growing conviction that everyone had the right to improve the quality of his life. In many cases, education was perceived as the passport.

Who are these so-called "new" students to higher education? They are generally older than traditional students, employed and so therefore part-time, and of a lower socio-economic status. They are often female, and represent a higher proportion of racial groups. They come to improve professional prospects, to retrain due to redundancy, to upgrade because of technological change, or to have a second chance (Orchardson, 1977:126). A report to the American Council on Education (ACE) (1974:47) indicated that "well over half of the student body, 57.5 percent," participated on a part-time basis and that their numbers were increasing at three-and-a-half times the rate of full-time students. Eliason (1980:3) reported that in the United States between 1970 and 1977 the proportion of two-year college students who were delayed starters (ages twenty-two to thirty-four) rose from 31 to 45 percent and two-thirds of these attended part time.

These new students accounted for most of the growth which colleges experienced in the seventies. However, Cross (1971:xii) maintained that postsecondary institutions were not ready to educate them because they did not fulfil the expectations that institutions had traditionally held for students.

Institutional response to this heterogeneous group has been varied. De Cosmo (1978:46-47) believed that in an area of reduced resources, many institutions tightened admission policies:

> With the advent of reduced resources, community colleges often "retreat" to the traditional two-year-college curriculum—career programs that already exist—thereby abandoning important elements of their comprehensive mission.

On the other hand, Gaff and Justice (1978:86) stated that some institutions' response was to broaden curriculum and expand catalogue offerings. The problem which then developed was that:

> Institutions that had changed their admission standards in response to new student populations now found themselves challenged by students with more limited preparation and faculty unable or unwilling to meet their learning needs.

The ACE report (1974:31) found that the attitude of academicians and policy makers generally was that students not in a full-time program were frivolous and wasteful of academic resources. In addition, Taylor (1979:5-6) pointed out that the cult of youth has been deeply rooted in our society. "For a majority of the population, education remains equated with schooling, and schooling is associated with dependency, failure or the fear of failure, irrelevancy to 'real life' and immaturity." He suggested that society needed to generalize its concept of growth and development to be much less age-specific.

Despite bias against adult, part-time students, the ACE report (1974:38) found that they are equally or more seriously motivated than their traditional counterparts, drop out less frequently, have equal intellectual ability and more accrued experience to profit from exposure to postsecondary learning, and achieve as well or better academically.

Although some changes have been made to accommodate this new population, part-time students are still severely discriminated against in terms of program and course selection, tuition, aid, and special services. The majority for nearly a decade, they are still forced to play by the minority's rules.

Along with the new student population have come new program demands as society's needs change.

New Program Demands

Another positive but unruly force which is buoying up the field of postsecondary education is the recent trend toward lifelong learning. According to Cross (1971:173), the most rapidly growing segment of education was outside the traditional core. Included in this category were programs sponsored by employers, proprietary schools, correspondence courses, educational television, continuing education, and individual, non-structured learning activities. As Gilder (1980:85) indicated:

> Adult students seeking out opportunities which are realistic and convenient have found themselves in learning situations that place them in schools, in colleges, in churches, in local and state libraries, in museums of every description, in large and small businesses, in organized labor unions, in the armed forces, and in other community action agencies. Each of these developed responsive educational services to fill existing needs not being met by the community college and university structure of our nation.

Yet ironically, it is part of the mandate of community colleges to meet these very needs. Why, then, are potential students going elsewhere? Gilder (1980:69) suggested that the cause has been the aging policy structure of colleges which has remained unresponsive to rapidly changing demands. Policies and funding formulas at both the provincial and institutional level need to become more flexible. As Gilder (1980:86) warned:

> We have already seen—by the very rich tapestry of existing lifelong learning opportunities—that where colleges are not "up to the challenge" they simply will be left out of the adult learning structure of the future.

Often demands for college programs are being made in the occupational-technical fields. Eliason (1980:4) reported that nearly half of the two-year college students are taking courses of this type. She predicted that the areas of health technology, business, data processing, and public service would likely be in the most demand in years ahead while the humanities and social sciences would continue their downward enrollment trend (1980:8).

Overall, then, community colleges are operating in a new environment. Resources are scarcer and government is exacting more control over the course colleges chart for themselves. A different student population has elbowed its way to a majority position with different needs and different demands from those institutions have been accustomed to fulfilling. New program possibilities have opened up in the areas of lifelong learning and in the occupational and technical fields. Other institutions are willing to provide services if the colleges are unable to do so. Some traditional ways in which postsecondary institutions have responded to change will be explored in the next section.

INSTITUTIONAL RESPONSE TO ENVIRONMENTAL CHANGE

Organization-Centered Responses

Of institutional responses to environmental change recorded in the literature, most have been of the organization-centered variety, and many have been short-sighted. Indeed, as Shane (1976: 80) remarked, "Much of U.S. education . . . remains deeply troubled and basically unchanged since the early 1960s despite agonizing reappraisals . . ." Perelman and Bergquist (1976:436) suggested that the inadequacy of responses in postsecondary education has resulted from ignorance about the dynamics of change. Their conclusion was that, for the most part, efforts to respond have been "small in scale, uncoordinated, and often parochial." The majority of responses have been of the organization-centered types suggested by Thompson (1967) of buffering and structure tightening.

The most obvious reaction to environmental uncertainty has been to provide a buffer for the technical core, the teaching-learning process, to protect it from change. However, a glance at any college budget reveals that most operating funds are apportioned for salaries. Therefore very little manipulation of materials, supplies, and other services can be effected before classrooms will feel the pinch. The demoralizing climate created by dirty halls and broken typewriters may more than offset any gains made in this protectionist approach. The interesting case study of New York City Community College (Sussman, 1978) proved that the pledge to cut things before people could only be short-lived.

Another response to environmental change involves tightening college structure. De Cosmo suggested the concepts of "pruning and grafting" (1978:49) to respond to fiscal restraint. This involved the trimming and consolidation of courses and programs. With careful planning, this process could result in a tighter, more effective organizational structure, yet frequently the outcome has been increased rigidity, goal displacement and stagnation. Perelman and Bergquist (1976:437) feared a rash of "showmanship" responses, "a large number of superficially 'relevant' but low-quality courses and programs . . . created to attract harder-to-get dollars and students." These poor quality courses could discredit postsecondary education in the public's mind, leading to "even greater retrenchment, dog-eat-dog competition, and ossification of the system."

Taylor (1979:26) maintained that buffering or structure tightening was not enough. The very nature of the technology had to change to meet the needs of adult learners and the structure of programs and courses had to be reorganized to allow for recurrency and the interpenetration of education with full-time employment.

Organization-centered responses in isolation seem unlikely to provide adequate change for organizational survival. Colleges need to reach out into the environment to retain their relevance.

Environment-Centered Responses

The boundary-spanning activities suggested by Thompson (1967) have developed into interorganizational relationships in attempts to counteract institutional dependencies. According to Van de Ven (1976: 305-306) these relationships were caused by either the internal need for resources or the shared commitment to an external need or opportunity. Most interorganizational relationships among post-secondary institutions appear to have been based on a shared internal need for funds although some have been formed out of a recognition of external demands for such services as distance and community education.

Dennison (1979) suggested the formation of an apolitical, provincial inter-body, initiated by the institutions themselves, to define, rationalize, and recommend to the government what their various functions should be.

Perelman and Bergquist (1976:435-436) also saw the need for meta-institutions to span both cultural, disciplinary, and institutional boundaries:

> A policy-oriented system dynamics analysis would be extremely helpful to educational leaders in gauging the total system response to alternative policies over the next few decades.

But as Van de Ven (1976:311) pointed out, interorganizational relationships could be incremental and slow and the barriers of competition and hostility hard to overcome.

Environmental theory has moved beyond the involvement of organizations with their environments to suggest that organizations should exert some actual control.

Environmental Control

Although evidence of environmental control exists in the post-secondary setting, little has been written about it. The manipulative aspects of this approach may discourage open discussion of such strategies. However, there are examples of attempts to increase visibility to procure funds, as noted by Kimberley (1975:6).

The need for political connections indicated by Pfeffer (1973) has also been acknowledged. Small et al. (1976:31) recommended not only government-watching, but also effective participation ". . . to ensure that the interests of the institution are borne in mind by government." They suggested that institutions' assessment of educational needs was only half the task; the other half involved both ensuring awareness in the marketplace and creating demand.

Some of the tactics for environmental control suggested by Pfeffer and Salancik (1978:96-102) included: (1) sequential attention; (2) nondisclosure; (3) playing one interest group against another; (4) control of communication channels; (5) control of the definition of satisfaction; (6) self-regulation; and (7) control of discretionary behavior. Wittingly or unwittingly, postsecondary institutions use these strategies but to date the results have remained institutional secrets.

To summarize, the majority of postsecondary institutional responses to environmental change have been such organization-centered activities as buffering and structure tightening. These attempts have generally proved short-sighted and inadequate. Institutions have tried to reach beyond their own boundaries in more environment-centered responses such as interorganizational relationships but are frequently hindered by competition and hostility. Although evidence of environmental-control strategies exists, institutions are reluctant to discuss them. In essence, it appears that different approaches to organizational planning must be employed if postsecondary institutions are to deal appropriately with their rapidly changing environments.

THE NEED FOR IMPROVED EDUCATIONAL PLANNING

Prior to the 1960's, Hemphill (1970:57) stated all educational administrators were involved in planning, but on a narrow, short-term basis. He maintained that the speed of societal change since then has made educational planning "an appropriate and legitimate specialty area for study and practice in education." However, he added that planning has often made situations which were inherently bad, efficiently bad.

Downey indicated (1970:9) that major shortcomings in educational planning to date had included:

1. a lack of articulation between long-range social forecasting and the planning process
2. a lack of specificity in defining the mandates of various systems and institutions
3. insufficient precision in establishing indices of efficiency and in the specification of costs and benefits
4. inadequacy in the tools and techniques of evaluation
5. a lack of coordination among planning endeavors.

Ziegler (1970:19-23) presented a typology of educational planning, dividing it into three categories. The first was preventative planning or crisis planning whereby the present was intervened with to avert an undesirable forecast. Such planning lacked comprehensiveness. As he pointed out (1970:19), "Its view of the future is uni-dimensional. It does not take into account a range of other factors which might modify our perception of crisis." Ziegler's second category was adaptive planning whereby the present was adapted to fit an unpreventable eventuality. This made education into a totally reactive system. His third system was inventive planning whereby a desired future state of affairs was invented and attempts made to bring it to fruition. "It is an attempt to articulate, quite precisely, a range of alternative futures among which will be one or more we might purposefully seek to achieve, to adopt as the goals of our policies, planning and education practices" (1970:22). He further elaborated the benefits of inventive planning as follows (1970:23):

> It asserts that past educational practices and goals, projected into the future, are powerful constraints; but that they are not inexorable. It assumes that the future can be invented; that we can impact upon it, that we can choose it, that we can open it up rather than close it down.

But in his future-oriented study of American community and junior colleges, Gleazer (1973:231) discovered that such initiative and creativity were uncommon:

> Community college planners appear to be saying that they cannot initiate change but must await and respond to change initiated by other institutions and agencies. They seem hemmed in by educational codes, traditions of higher education, the number and diversity of students, and minimal collegiality among faculty.

After twenty years of involvement in educational planning, the Organization for Economic Co-operation and Development (OECD) Secretariat has concluded that educational planning is still uneven, reactive, and single-minded (Berghofer, 1980:2). Although the need to consider many dimensions simultaneously from short-, medium- and long-term perspectives is recognized as essential in dealing with a turbulent environment, the means for accomplishing this end have remained obscure or impracticable.

Recent suggestions made by Alberta Advanced Education and Manpower officials (Berghofer and Pickard, 1980:13-15) to the OECD for improved educational planning in the eighties included:

1. The ability to handle conflicting issues simultaneously
2. An awareness of environmental forces
3. The sharing of information and perceptions between government and institutions to reduce uncertainty and facilitate change
4. A comprehensive, interactive communications network between government and institutions and their environment
5. A close meshing of planning activities with decision making
6. A dual capability for immediate response and long-range analysis.

Educational planning has been a topic of continuing interest in Alberta over the last decade and some unique planning activities have occurred. These will be reviewed briefly in the next section.

THE ALBERTA CONTEXT

Historical Overview

In the late sixties and early seventies, the rapid economic growth in the province of Alberta, coupled with a government supportive of the goals of education, fostered an experimental, future-oriented climate for educational planning.

A number of exciting planning projects was initiated under the umbrella of The Alberta Commission on Educational Planning. Its commissioner, Walter Worth (1970:63), explained that the entire Commission had a future-orientation "to avoid the mistakes of the past, to anticipate new needs, problems, or alternatives, and to suggest solutions or propose interventions." The scope of the

Commission was broad, bringing all levels of education from nursery education to lifelong learning under its scrutiny.

Input to the Commission was based on a mixed model employing short-term extrapolation techniques regarding demography and economics, medium-term single alternative proposals in the form of position papers, and long-term alternative futures forecasts based on expert judgements elicited through the Delphi method (Worth, 1970:64). Among the Commission's terms of reference were:

> Enquiring into current social and economic trends within the province and determining the nature of Alberta society during the next two decades.

and

> Enquiring into and recommending on the appropriate permanent structure and processes for the administration and coordination of the total educational organization and for long-range educational planning. (Worth, 1970:63-64)

The Commission's final report, entitled A Choice of Futures (1972), called for both increased diversity and coordination in the postsecondary system: "Planned differentiation in mission, size and character is the path that higher education must follow if it is to maximize its contribution to the general goals of education" (1972:55). The commissioner believed that the need for permanent planning structures could be met, as he stated (Worth, 1970:67):

> Hopefully, our efforts will yield at least some partial solutions to the fundamental problem of policy-planning—the potential conflict between the central technocratic basis necessary for effective system planning to ensure comprehensiveness as well as specialization and differentiation, and the creative process of change and improvement which requires the active involvement of individuals, groups, communities, institutions, and sub-systems.

At the same time, a great deal of research was being conducted which related specifically to the college sector.

In an overview of the Alberta college system, Kolesar (1971: 29) outlined the following significant trends:

> 1. There are increasing enrollments both in the absolute and relative sense in all post-secondary institutions.
> 2. There is a continuing reassessment of instructional purpose and of all aspects of operation in all post-secondary institutions.
> 3. There is increasing demand for resources: for personnel, for facilities, and for funds.
> 4. There are increasing stresses associated with the growth and change of institutions.
> 5. There is increasing demand by the public for justification by each institution of its purposes and procedures.
> 6. There is increasing demand from all authorities for long-range planning.
> 7. There is increasing demand for central coordination and planning, accompanied by a demand for greater local autonomy for institutions and for greater freedom for individuals and groups within the institutions to make decisions.

In a summary of the findings of a survey conducted by the Planning Committee of the Canadian Commission for the Community College, Thiemann (1971) reported that the problems, issues, and conditions concerning postsecondary education in Alberta included ecological considerations, escalating costs, and demands for accountability. These were seen as "causes for a shift occurring in the distribution of power and in the values and goals of Alberta society" (1971:75). In addition, public pressure was demanding more community involvement which entailed ". . . a redefinition of the colleges' purpose, a better articulation between institutions and between the schools and the community, and finally making education more relevant to the needs of the individual and his immediate society" (1971:76).

In 1970, the Alberta Colleges Commission had established a committee to design a planning project to develop an educational master plan for the Alberta college system. At the request of the Minister of Education, the project was expanded in 1971 to take into account all publicly supported postsecondary non-university and continuing education services in the province. The purpose was "to propose alternative proposals for Cabinet consideration regarding system-wide coordination and master planning . . ." (Bosetti, 1972:1). In addition, five terms of reference were identified:

1. To describe an organized system for post-secondary non-university education.
2. To serve as a vehicle for further planning and establishing priorities.
3. To facilitate coordination among institutions comprising the system.
4. To serve as an effective public relations instrument.
5. To provide a means for removing post-secondary development from purely political considerations and local pressures.

The final report, entitled Master Plan Number One, was based on a series of commissioned monographs or technical papers and on consultation by its author, R. A. Bosetti, with a wide range of individuals and groups. A list of twenty general recommendations was made along with ninety-three more detailed ones. These recommendations addressed particular institutions and specific problems. Perhaps the most critical recommendation was (1972:5):

> Establish an integrated system of advanced education coordinated by a single planning-review agency of government.

In the same year the loosely-knit Alberta Colleges Commission and the Alberta Universities Commission were replaced by the Department of Advanced Education. In addition to its role of administering and disbursing all funds to postsecondary institutions, the new Department had a broad, coordinating function with regard to programming.

In 1974, the Department of Advanced Education implemented the Program Coordination Policy to coordinate new program development at all public postsecondary institutions in the province. Guidelines and procedures were outlined for the preparation, review, approval, and implementation of new programs. Its purpose was to provide comprehensive service while eliminating unnecessary duplication. A province-wide postsecondary system had been established.

There has existed in Alberta, however, a strong tradition of local autonomy. Older colleges such as Mount Royal and Lethbridge had developed close ties with their communities. The agricultural colleges brought into the system had long relied on local initiative. And the far-flung northern colleges had developed independence through necessity. The disparate group of colleges pulled together into a strongly centralized system was bound to experience stress and the Department had a challenging task to perform.

As of 1980, the Program Coordination Policy is still in effect and recent proposed revisions to it encourage a more cooperative approach. They stress the sharing of information locally, regionally, and provincially and encourage the preparation of institutional development plans on a five-year planning cycle. But program approval remains with the Department. Funds are allocated by the Department. While accepting the system and thriving in it, colleges are still sensitive to the loss of local autonomy.

In 1975 the Manpower Division of the Department of Labour was moved to the Department of Advanced Education, creating a new department, Alberta Advanced Education and Manpower. It brought with it the Planning Secretariat, established in 1973, thus providing an in-house planning capability unlike any other in Canada (Alberta Advanced Education and Manpower, 1980c:2). It makes no decisions but simply provides a service to decision makers. According to its Executive Director (Pollard, 1980), the Planning Secretariat acts as an internal consultant to the Deputy Minister of the Department, providing economic and demographic information for planning and policy purposes. Along with the Planning Secretariat, the amalgamation brought access to other apprenticeship and industrial training programs to provide a broader spectrum for postsecondary planning.

Finally, in this chapter on the postsecondary setting, it is essential to look into the future to see what may be in store for Alberta's community colleges.

Alberta's Future

What does the future hold for the postsecondary system in Alberta? A swift glance at the province from the perspective of Hall's typology of environmental forces (technological, legal, political, economic, demographic, ecological, and cultural) reveals that all these forces are interacting to create a turbulent environment, making organizational response difficult.

Technology is rapidly changing. Demands will be made by technological advances for higher educational levels to allow for easier adaptation to technological change and greater flexibility for work transference (Peitchinis, 1979b:15-16). According to recent forecasts from the Planning Secretariat of Alberta Advanced Education and Manpower, the resource development of the last decade is anticipated to continue but a shift in employment patterns is expected from primary industries (mines, quarries, and oil wells) and their management, to tertiary industries (finance, insurance, real estate, community, business, and personnel service) (1980a:17). Lifestyles should also change, due to technological advances. Peitchinis claimed that more advanced technological systems required a higher level of fundamental knowledge (1979b:15-16). Chambers (1979:49-50) suggested that Albertans will enjoy a combination of higher real capita income and increased leisure time.

Legal forces have codified a postsecondary system, overcoming the strains toward local autonomy. So far the universities have retained a certain amount of independence but financial constraints and declining enrollments may bring them to view an even more unified system more favourably. The technical institutes and vocational centres are demonstrating interest in both the board-governed model provided by the colleges and the concept of faculty unionization.

Political forces downplay the role of education to attend to the more pressing issues of industry and resource development. However, cries of projected manpower shortages are beginning to have an impact, as in the example of the new technical institute slated for construction in Edmonton. A continuing suspicion about the value of academic learning in the marketplace is resulting in an over-all decline in the university sector population, while the non-university sector is generally gaining enrollment (Planning Secretariat, 1980 a:33).

Economic considerations dominate both personal and government planning. The spectacle of inflation and expansion, hand in hand, continues to baffle experts. According to the Planning Secretariat's recent forecast, rapid economic growth will continue at least through 1988 (1980a:1). The four proposed mega-projects, the Alaska Highway Gas Pipeline, the Esso heavy oil plant at Cold Lake, the Alsands project, and the expansion of Syncrude have been the reasons for Alberta's bright prospects in an otherwise rather dim North America.

The demographic implications of such rapid economic expansion are that Alberta's population will increase by about one-third during the 1979-1988 period, bringing the total to approximately 2.7 million (1980a:3). The largest proportion of this increase will result from in-migration, while the proportions of immigration and birth-rate will remain at their present levels (1980a:4). While the 15-24 age group will experience little growth during this period, the increase will mainly result from the influx of 25-44 year olds (1980 a:4). Major population increases will occur in the areas of Medicine Hat, Red Deer, Calgary, Edmonton, and Fort McMurray, the areas of greatest economic growth. Peitchinis (1979a:3) suggested that competition with Ontario and British Columbia for workers would lead to an upgrading of Alberta's lifestyle:

> Alberta must offset its locational disadvantages with higher wages and salaries, better educational, health and recreational facilities and services, and generally a superior way of life.

Ecological forces are tending to bring organizations together in their attempts to cope with rapid change. The escalation of environmental uncertainty will continue to be sufficiently threatening to combat organizational hostilities. In addition, ecological considerations will continue to place environmentalists in the headlines and force industry at least to pay lip service to them.

Cultural forces are at work changing the texture of life for us all. Eyford (1979:87) outlined the symptoms of cultural change to be found presently in Alberta:

1. Changing patterns in family and marriage
2. A questioning of the traditional work ethic
3. The impact of sophisticated technology and industrialization; the impact of the media
4. Increasing ethnic diversity throughout the province
5. Skepticism about traditional education as the royal road to success and happiness; recognition of the need for lifelong learning and for educational alternatives
6. Increasing interest in food, health, fitness and self-development
7. Concern about the environment and about ecology
8. Changing moral codes and ethical values
9. Increasing availability of leisure time
10. An awareness of global interdependence.

The trends that various environmental forces are taking, as outlined above, are projections of the present into the future, and do not take account of the impact of these forces on each other or of the totally unforeseen events which are bound to occur. In addition, inventive planning requires the creation of a spectrum of alternate futures with the means of attaining them mapped out.

This study has attempted in a small way to go beyond environmental projections to view possible impacts of these forces on the community colleges and to pursue the policy implications of one specific perceived future. It deals in the realm of perception rather than in that of quantifiable statistics, and as such, provides an enriching element to the future decision-making context in Alberta. It is, however, only one piece of input in what must be a wide variety of types of input necessary to a more inventive planning process.

SUMMARY

This chapter explored the new climate of postsecondary education, outlining a number of factors at work in the environment to bring this about. Included for consideration were the presence of change itself, the loss of institutional autonomy, the new student population and the new program demands being placed on colleges. Then the postsecondary setting was placed in the theoretical framework set out in Chapter II. Both organization-centered and environment-centered responses were discussed as recorded in the postsecondary literature. Next the need for improved kinds of educational planning was examined, followed by an overview of planning activities which have occurred in Alberta. Finally the forces at work determining Alberta's future were reviewed briefly from the perspective of Hall's Typology, and the purpose of the present study was set into context.

Chapter IV

METHODOLOGICAL FRAMEWORK

The methodology employed in this study is the Delphi method; more particularly it is a policy Delphi study. This chapter provides a detailed review of the method as it has developed over the past twenty years. The first section is an overview of the Delphi method in general, defining it and outlining its major characteristics, and then describing briefly the history of the method and its future uses. The second section deals with methodological issues, discussing both advantages and disadvantages of the method. The next section provides a description of the particular form of Delphi known as the policy Delphi, the methodology used in this study. The fourth section reviews some Delphi studies conducted in the field of postsecondary education, with particular focus on four Delphi studies which were carried out in Alberta during the last decade. The final section of the chapter outlines methodological and process features of the present study and its major limitation.

OVERVIEW

Definition and Characteristics

The Delphi method is a structured, multistep, anonymous communication process which allows a group of individuals to deal with a complex problem. The carefully designed iterative questionnaires involve the feedback of information and aggregated judgements derived from earlier parts of the process, requesting assessment and reassessment of group views.

The defining characteristics of the Delphi method include:

1. Iteration or controlled feedback at various stages of the process.

2. Anonymous response ensured by questionnaire or computer.

3. Statistical analysis of group responses.

4. Revision of judgement in the light of added information.

5. Reliance on intuitive judgement which may or may not be "expert."

6. A goal of consensus or the delineation of pros and cons of an issue.

At least two, and usually three, groups of individuals are involved in the process: the design and monitor team, the group of respondents or Delphi panel, and generally the user group who requests that the study be done.

Traditionally, the Dephi method has involved the following phases (Linstone and Turoff, 1975:88):

1. Formulating the issues
2. Exposing the options
3. Determining initial positions on the issues
4. Exploring and obtaining the reasons for disagreement
5. Evaluating the underlying reasons for disagreement
6. Reevaluating the options.

Interactive communication is structured between the individual respondent and the Delphi panel in the following ways: feedback of individual contributions is provided to the group; group judgements are solicited, computed and summarized by the monitor team; these group judgements are reassessed by the individual. The process generally continues through three or four rounds of questionnaires until some kind of resolution is effected. The Delphi method has been described as "a combination of a polling process and a conference procedure" (Linstone and Turoff, 1975:5).

According to Hencley and Yates (1974:16) it is a particularly useful method for identifying:

1. Intuitive estimates or judgements of alternative futures
2. Expected time scale estimates of future events
3. Expected paths that evolving multifold change could take
4. Expected breakthroughs
5. Future opportunities, problems, needs, desires and threats
6. Useful data in areas where historical trends are not available
7. Programming opinions—a tool for teaching participants.

This list has been extended by the more specific suggestions of Linstone and Turoff (1975:4) to include:

8. Evaluating possible budget allocations
9. Exploring urban and regional planning options
10. Planning university campus and curriculum development
11. Putting together the structure of a model
12. Delineating the pros and cons associated with potential policy options
13. Developing causal relationships in complex economic or social phenomena
14. Distinguishing and clarifying real and perceived human motivations
15. Exposing priorities of personal values and social goals.

Judging from this lengthy list of suggested uses, a generalization for the appropriate application of the Delphi method might be that it lends itself to problems which cannot be solved by precise analytical techniques but which can benefit from subjective judgements on a collective basis (Linstone and Turoff, 1975:4).

History and Future of the Delphi Method

. The Delphi method was invented in the early 1950's at the Rand Corporation by Olaf Helmer and Norman C. Dalkey in a study entitled "Project Delphi." The study applied expert opinion to the viewpoint of a Soviet strategic planner in order to identify optimal American industrial targets and estimate the number of atomic bombs required to reduce the munitions output of these targets by a prescribed amount.

During the sixties, the method was generally applied to technological forecasting, particularly in the aerospace and electronics industries. Heavy investment and rapid development placed a great burden on industry and defense planners who came to employ the Delphi method as a fundamental tool for technological forecasting (Linstone and Turoff, 1975:11). It is still used today by many technologically-oriented corporations.

Since that time, the use of the Delphi method has broadened to become a multiple-use planning tool by government as well as industry. The growing need to incorporate subjective information into the analysis of complex problems has led to its use in such fields as education, health, urban renewal, transportation, environment, and management science. Helmer (Linstone and Turoff, 1975:xix) commented that although its principal area of application has remained that of technological forecasting, it has been used in other contexts where judgmental information is indispensable:

> These include normative forecasts; the ascertainment of values and preferences; estimates concerning the quality of life; simulated and real decision making; and what may be called "inventive planning," by which is meant the identification (including invention) of potential measures that might be taken to deal with a given problem situation and the assessment of such proposed measures with regard to their feasibility, desirability, and effectiveness.

The future for the Delphi concept looks promising in several areas: in computer conferencing, as a supporting methodology for use in conjunction with other methodologies, and in the social sciences.

Turoff (1972:159) developed the computer conferencing approach to a Delphi exercise. As Rouse and Sheridan (1975:113) explained, ". . . the technology employed includes an electronic polling and display system combined with a computer terminal that is connected, via telephone, to a remote digital computer." Turoff soon discovered that long-distance conferencing had many possibilities besides that of a formalized Delphi. The concept has been developed into the Electronic Information Exchange System (EIES) at the New Jersey Institute of Technology. It provides private communication space for sending messages among individuals and groups, a common discussion space for conferencing in a group, a personal notebook space for composition and joint authorship, a publication space for all EIES members, a directory of members, flexible word processing and text editing, and advanced programming features (Turoff, 1978:9). A pilot study by Hiltz (1978:11) indicated that "naive" subjects could be taught the process of computer conferencing with only 20 to 30 minutes of instruction and were then able to communicate effectively about a complex problem. Evolving from the Delphi method, this existing field of human communication holds many possibilities. (Further information about the EIES is contained in Appendix 9.)

Secondly, the Delphi method is becoming a supporting methodology for use in conjunction with other methodologies. Cross-impact matrices were developed to make the Delphi method more quantitative (Rouse and Sheridan, 1975:117). Panelists estimate relative probabilities and absolute probabilities are then computed. A limitation of this combination of techniques is that issues must be simplified to relatively few estimates. Delphis have been combined with other methodologies to precede, parallel, or follow them, such as scenario writing, trend analysis, morphological analysis, and simulation forecasting. An analysis of Delphi applications by Brockhaus and Mickelsen (1977:108) found that most Delphi experts felt that the method should be used in conjunction with another formal method; however, despite this prevalent belief, over a third of the studies surveyed used the Delphi alone.

While historically, Delphi studies have been in the physical sciences and engineering, increased usage is expected mainly in the social sciences (Brockhaus and Mickelsen, 1977:110). Future applications include "assessing social values, measuring the quality of life and society, and determining the social worth of various occupations in comparison with current wages and salaries" (1977:107). The political arena is also a rich field for Delphi applications for national policy and planning formulation. Potential topics in the field of business and economics include such issues as ". . . material shortages, the energy crisis, pollution control, long-range forecasts for various product types and industries, and the impact of the interaction of future world economic conditions with future political conditions or potential world conflict."

METHODOLOGICAL ISSUES

Advantages of the Delphi Method

There are several unique advantages to the Delphi method which continues to be a useful forecasting and decision-making tool. Based on the premise that many heads are better than one, it refines and organizes group judgements on complex subjects in a systematic fashion. Specific advantages of the method include: anonymity of participation, controlled communication and feedback, time and cost efficiency, and pedagogical effect.

Anonymity of participation. Helmer and Dalkey (Ascher, 1978: 191) claimed that the Delphi method avoided many of the disadvantages of face-to-face discussion. The approach minimizes the emotional and psychological dynamics of group interaction. Dominant personalities are downplayed; group pressures avoided; hesitant participants are encouraged to contribute equally; groups which are politically at odds or individuals who disagree can be polled more reliably with fewer distracting factors intervening.

Controlled communication and feedback. The capability of structuring the communication process has the advantage of focusing more carefully on topic than is feasible at a round-table discussion. The role of the monitor as not only facilitator, but also as editor, aids in simplifying and clarifying the issues at hand. Also the built-in opportunity for revising opinion has a face-saving quality.

Time and cost efficiency. A large number of participants can be involved in the analysis of a complex issue at their own convenience. The problems of geographical distance and tight schedules are removed altogether by bringing the discussion to the individual. This advantage is being heightened even more by the on-line Delphi programs which are being developed. The administration of the method is relatively inexpensive, requiring only the time of the design and monitor team and occasional secretarial assistance. The time required occurs in bunched periods and allows other work to be accomplished in the intervals.

Pedagogical effect. Early in the seventies, at the time of Weaver's condemnation of the Delphi method (see below), much was made of the pedagogical effect of participating in a Delphi exercise. He considered it a useful device for obliging people ". . . to think about the future . . . in much more complex ways than they ordinarily would" (1970:3), and indeed, concluded that it was the single major advantage of the technique. However true this may be, it is singularly difficult to measure the learning which has taken place among respondents, and apart from the Alberta study by Berghofer in 1972 (see below), few attempts have been made to do so. Nevertheless, Delphi designers continue to believe that respondents view participation as an interesting, enriching, and useful task (Weatherman and Swenson, 1974:112).

Disadvantages of the Delphi Method

The Delphi method has been labelled unreliable, unscientific, and misleading. Although a great deal has been written about the disadvantages of the method, there appear to be only five major areas of criticism: convergence, explanatory power, panel selection, predictive accuracy, and process weaknesses.

Convergence. A significant disadvantage to Weaver (1970:2), a severe critic of the Delphi method, was the concept of forced convergence of opinion. A characteristics of traditional Delphis was to provide panel members with group response means and each individual's former answers and suggest revision of estimates. Generally revised estimates shifted toward the group norm regardless of what might be considered the "true" answer. This led to a series of attempts to explore the personality traits of respondents who did or did not shift, such as affective and inclusion needs, information processing skills, and abstract as opposed to concrete reasoning skills (1970:18-19). For a time, the convergence issue clouded the utility of the Delphi method altogether, but the many varieties of Delphi which developed in the seventies have tended to downplay the significance of convergence of opinion, or, as in the case of the policy Delphi, avoid it altogether.

Explanatory power. Another disadvantage of the Delphi method cited by Weaver (1970:37-38) was its failure to clarify and share assumptions. Traditionally, only items of disagreement were probed for supporting reasons so that one had no way of knowing whether judgements which achieved consensus were based on false or naive assumptions, linear thinking, or sheer coincidence. Weaver claimed that because of this weakness, ". . . forecasts fail to convince. They offer no reasonable options. It seems fundamental that future studies will have little value to policy makers unless they open options." One recent Delphi innvoation which counteracts this problem is the request that respondents provide supporting reasons for their statements or selections (Jillson, 1975:129).

Panel selection. An issue of long standing, with regard to Delphi panels, has been the "expertness" of the respondents. An inadequate panel can produce nothing more than pooled ignorance (Brook, 1979:379). In 1959, Helmer and Rescher defined an expert as having three characteristics: rationality, background knowledge in a particular field, and reliability and accuracy of predictions over time (Weaver, 1970:22). However, as Judd (1972:181) pointed out:

> There is a tremendous difference between a panel of 12 to 15 scientific experts concerned with a technological-forecasting Delphi problem and panels of 100 on through 1,000 found in educational Delphi undertakings.

Small expert panels may reflect the hazard of inbreeding, while large, broadly representative panels may discourage active participation by the mechanics involved in their administration. The best approach to panel selection would appear to be to carefully match panel expertness, breadth, and size to the objective of the study in question, representing as many viewpoints as feasible while maintaining manageability.

Predictive accuracy. Weaver was concerned about forced convergence and the "true" answer. He reported that early studies by

Dalkey (Weaver, 1970:16) found the accuracy of group responses to increase with iteration while Campbell (Weaver, 1970:17) found convergence tended to exclude the correct answer. Recent Delphis have tended to be more of an exploration into complex issues in order to uncover options than a search for a right answer.

Process weaknesses. The strongest critic of Delphi processes was Sackman, who in 1974 under the auspices of the Rand Corporation, published a searing attack on the value of the Delphi method. He concluded that in the light of current standards for social experimentation, test design, sampling, use of experts, and interpretation of findings, the Delphi method was unreliable and unscientific and should cease to be used. While proponents agreed that Delphi processes could frequently be more stringent, they felt that Sackman had missed the crucial point that the Delphi method was not a scientific tool and therefore should not be judged by the scientific canons for survey research (Coates, 1975:193). In addition Sackman had limited his comments to the traditional Delphi and had ignored the numerous variations and advances which have been occurring since the late sixties. As Linstone and Turoff stated (1975:3), the Delphi method is more of an art than a science, a structured conversation or communication technique for drawing forth ideas, options, alternatives, etc. Coates (1975:193) refuted Sackman's attack by concluding:

> The value of the Delphi is not in reporting high reliability consensus data, but rather in alerting the participants to the complexity of issues by forcing, cajoling, luring them to think, by having them challenge their assumptions.

Process weaknesses which have been demonstrated in various Delphi studies include:

a. Lack of certainty in guidelines for design.

The basic strength of the method, its flexibility, can also be its downfall in a poorly designed study which is hastily constructed.

b. The character of Round I.

Controversy exists over whether to have respondents react to prepared statements, mind sets, or other input or whether to have respondents reply in a non-structured fashion.

c. The process of summarizing and editing.

Uneasiness has been reported by study monitors (Rasp, 1974:324) as to the construction of subsequent questionnaires, having them reflect sufficiently participants' views and comments while summarizing clearly and imposing some form of structure. At the same time editorial bias must be avoided.

d. Time frame.

The Delphi method is relatively lengthy and is not a technique to be used in a crisis. Including design time, it can run from four to eight months and should not be rushed.

THE POLICY DELPHI

Of particular interest to this study is the development of a specific type of Delphi exercise known as the policy Delphi. It was developed by Murray Turoff in 1969 and proved a significant departure from the understanding and application of the Delphi method up to that point (Linstone and Turoff, 1975:84). Rather than seeking consensus, the policy Delphi ". . . seeks to generate the strongest possible opposing views on the potential resolutions of a major policy issue." Rather than stressing the expertness of the panel, Turoff claimed, ". . . a policy issue is one for which there are no experts, only informed advocats and referees." And rather than stressing the goal of a "correct" or "true" answer, he pointed out, "it is unlikely that a clear-cut . . . resolution of a policy issue will result from such an analysis; in that case, the issue would cease to be one of policy."

Turoff viewed the policy Delphi as a precursor to a committee activity. It provided an organized method for correlating views and information pertaining to a specific policy area and was not to replace other types of studies and analyses, or staff work, or the committee itself (1975:87). As possible objectives for policy Delphis, he suggested (197 :149):

> To determine or develop a range of possible alternatives
>
> To explore or expose underlying assumptions or information leading to differing judgments
>
> To seek out information which may generate a consensus of judgment on the part of the respondent group
>
> To correlate informed judgments on a topic spanning a wide range of disciplines
>
> To educate the respondent group as to the diverse and interrelated aspects of the topic.

Because policy Delphis deal mainly with statements, arguments, comments, and discussion, it was necessary to provide some means of quantifying the data. Hence, Turoff suggested such rating scales as the relative importance, desirability, confidence, and feasibility of various policies and issues (Linstone and Turoff, 1975:89). He recommended the use of a four-point scale to discourage neutral judgements. "A neutral position offers very little information in policy debates and it is usually desirable to force the respondent to think the issue out to some point where he can take a nonneutral stance" (1975:90).

The outcome of a policy Delphi cannot be predicted if it is an honest exercise. Sometimes movement can be seen from disagreement on a topic toward agreement; other times an exercise can start with agreement and end with disagreement. Possible dangers which are unique to a policy Delphi include: (1) misinterpretation of the exercise as a policy decision tool rather than as a policy analysis tool; (2) constraints on the diversity of the respondent group; and (3) use of the policy Delphi as a political weathervane to test the acceptability of a policy issue (Turoff, 1970:154-155).

A policy Delphi which proved a useful model for the design of this study was the National Drug-Abuse Policy Delphi conducted by Jillson in 1974 at Johns Hopkins University. Her objectives were: (1) to develop a range of possible drug-abuse policy options; (2) to explore applications of the policy Delphi methodology to this and other areas of social policy; (3) to explore the possibilities of applying the technique on an as-needed basis and on an on-going basis (Jillson, 1975:125).

In Round I respondents were requested to develop up to five national policy objectives in the field of drug abuse over a five-year time frame with up to three key indicators for each. In addition, they were presented for consideration with a transition matrix to depict the flow from one state of drug involvement to another, and twelve should/should not policy issue statements. Of the 38 respondents, 69% or 24 completed the round (1975:129).

Round II returned the policy objectives generated in Round I to be rated for feasibility and desirability, and the key indicators to be rated for importance. The twelve policy issue statements plus fifteen additional ones suggested by respondents were returned to be rerated. This round was completed by 71% or 25 respondents (1975:132).

Round III returned 25 policy objectives for rerating due to a broad distribution of voting responses on the previous round. The revised transition matrix from Round I was submitted for further consideration (1975:134). Unfortunately the results of this round and conclusions for the study were not published and a written request for further documentation was not acknowledged.

DELPHIS IN POSTSECONDARY EDUCATION

Finally, and briefly, before turning to the study at hand, Delphi studies in the field of postsecondary education should be reviewed. The method has been actively used by educators in such areas as goal formulation, curriculum planning, campus design, evaluation of staff, and cost-benefit analysis. Linstone and Turoff (1975:82) found it not surprising that educators were enthusiastic about the method:

> There is a high degree of participative planning in higher education. Authoritarianism is eschewed to such an extent that anarchy sometimes results. There's also an entrenched

> bureaucracy which feeds on well-structured procedures and questionnaires of all kinds.

However, when commenting upon an Israeli study on the topic of education in the year 2000, R. Elboim-Dror warned that the danger existed of limiting creativity and cramping the generation of new alternatives in the atmosphere of an educational bureaucracy (Linstone and Turoff, 1975:82).

Early studies in postsecondary education included the Institutional Goals Inventory, developed by Norman P. Uhl for the Educational Testing Service. This study presented respondents with a ready-made list of goals and requested reaction. A 1970 study by Cyphert and Gant at the University of Virginia took another approach and used an open-ended question format to determine where the School of Education should concentrate its energies for the next decade. Judd (1972:177) used a Delphi study to establish guidelines for the degree of involvement of faculty in curriculum change, and substantial changes were effected based on the study's findings. Fox and Brookshire (Judd, 1972:179) conducted a Delphi in 1971 to have faculty list the ingredients of effective college teaching and developed a list of fifteen elements. That year also, Hearon presented a doctoral dissertation at UCLA (Judd, 1972:179) in which he had employed the Delphi method to probe the effectiveness of student participation in junior college administration.

Recent Delphi studies include one conducted in New Zealand in 1977 by Battersby (Elms and Battersby, 1979:7) who investigated the expectations held for beginning teachers by primary school principals, teachers' college lecturers, and second year primary student teachers.

He found high group consensus that technical skills such as planning, evaluation, communication, and management and organization were the most important skills for a beginning teacher. In 1978 Nelson and Ducanis identified the types of data used by college presidents to assess their institutions' stability over a four year period, and found that although the context in which decisions were being made was changing, the indicators of institutional vitality used by presidents (Student Flow, Finance, and Personnel) did not. In 1979 Brooks (1979:383) conducted a Delphi study for the University Council of Educational Administration (UCEA) to identify critical problem areas to be addressed by the Council's next five-year plan. The ten central problems which emerged were: (1) Funding for Education; (2) Competency Testing; (3) Legal Concerns; (4) Declining Enrollments and their Implications; (5) Public Attitudes toward Education; (6) Allocation of Resources for Special Education; (7) Evaluation of Personnel; (8) Program Priorities; (9) Maintenance of Quality in Schools; and (10) Professional Accountability (1979:384).

Four major Delphi studies have been conducted in Alberta during the last decade: a study by Dyck in 1970 for the Human Resources Research Council, a study by Clarke and Coutts in 1971 at the University of Alberta on the future of teacher education, a doctoral dissertation by Berghofer in 1972, also at the University of Alberta, to examine the effect of exposure to futures literature on educational policy makers, and a study by Konrad et al. in 1976, at the University of Alberta and in conjunction with the UCEA, to determine the most important professional development needs of middle-level college administrators in western Canada. The methodological base for the present study which these Alberta studies have provided warrants further elaboration.

Dyck, 1970

In conjunction with the Commission on Educational Planning, the Alberta Human Resources Research Council sponsored a series of six forecasting exercises on the topics of: (1) Future Changes in Values and Social Goal Orientations; (2) Future of the Family; (3) Leisure and Recreation in the Future; (4) Intercultural Relations in the Future; Native Peoples; (5) The Future of Politics; and (6) The Future Needs and Problems of the Individual. The purpose of this study was to prepare a series of forecasts of social phenomena which would have an impact on education, rather than to forecast the future of the educational system itself (Dyck, 1970:10). Interpretation of the implications of the scenarios generated by this study for education was left to a 1971 report by Baker. In Dyck's study, separate panels were created to deal with each of the topic areas by a modified snow-balling technique wherein experts recommended other experts in their area. Staff prepared topic outlines for each of the six areas which were included in the package of Round I materials along with blank sheets except for the titles, "Forecast" and "Reasons/Assumptions." Respondents were asked to look 30 to 40 years ahead. Staff organized and compiled Round I data into scenarios and requested in Round II that respondents consider probability of and specific dates for occurrence. Out of a total of 305 panelists, 126 completed the second round. Study conclusions were the following (1970:188):

1. Society is and will continue to be in a period of transition
2. Aspirations will outrun the ability to achieve those aspirations
3. Salient institutions—family, church, education, leisure, and politics—will undergo continued change
4. The value of the individual will be upgraded—expressed through education, leisure and religion
5. There will be higher levels of psychic and social unrest due to continued change.

This is the only Delphi study which this researcher could locate which specifically looked at environmental forces affecting education. No attempt was made to priorize these forces, rather a description of the overall societal scene was attempted.

Clarke and Coutts, 1971

Clark and Coutts used a set of thought-provoking statements about the future to set the tone for Round I of their study on the future of teacher education. Their panel included chief administrative officers from all the English-language teacher education institutions in Canada as well as other representatives of those institutions with more than 1,000 students. Round I was open-ended, inviting respondents to make statements about the future of teacher education. Round II returned edited statements for estimations of date of occurrence, from a series of given time intervals. Round III asked individuals to reconsider answers in the light of group responses to those items which had attracted bipolar or evenly scattered scores. Of the ten statements resubmitted in the hopes of achieving consensus, only four converged to any degree; the rest experienced little change. Round IV personalized the process by asking panelists to state the probable date of occurrence at their own institutions of the revised list of statements. Clarke and Coutts (1971:28) reported that professional opinions about the preparation of teachers were more alike than had been anticipated. The format of the questionnaires and recorded responses was particularly clear, and complete documentation of the study was available.

Berghofer, 1972

To study the effect of exposure to futures literature on educational policy makers, Berghofer established three panels of educational administration students, matched by familiarity with futures research and by personality constructs of integrative complexity and dogmatism. Group treatments varied in the degree of exposure to futures material. Each group was asked to judge the applicability of six key statements regarding education in Alberta over a 15-20 year time period. The group with the greatest exposure to futures material showed the greatest tendency to reject present policy and put forward alternatives, while the group with no exposure had the greatest tendency to advocate the continuation of existing policy or extrapolate present policy into the future. He also found some relationship between integrative complexity and comprehensiveness of future perspective.

Berghofer's conclusions supported the effectiveness of the Delphi method for educational policy questions when linked with futures information (1972:164):

> If the aim . . . is to obtain reasonably hard data on which to base the formulation of specific policies, it seems important that they be grounded in something more than personal whim and limited perspective of individual respondents. . . . it seems desirable to use Delphi interaction to obtain widespread participation in the process of developing educational policy. . . .

Of particular interest to this study was Berghofer's conclusion that no great value was attached to the usual Delphi procedures of revising opinions in the light of group norms. He suggested (1972:170):

> This essentially puts the respondent on the defensive and he may feel obliged to support his original stand. It seems likely that a more balanced judgement will be obtained if all respondents are encouraged to participate at the outset in a spirit of give and take.

Konrad et al., 1976

The 1976 study by Konrad and his associates asked two main questions (1976:44):

1. What are the most important professional development needs of middle level administrators in two-year postsecondary institutions in western Canada?
2. What relationships, if any, exist between the particular professional development needs identified by such administrators and their job circumstances, personal characteristics and professional background?

Round I provided respondents, again selected by a modified snowballing technique, with four statements about professional development as a mind set and asked each respondent to identify his most significant professional development needs. Round II required assessment of the sixty-five need statements generated on four-point scales for importance, urgency, and occurrence. Round III consisted of reassessment of individual responses in the light of Round II group responses.

In response to the study's first major question, findings indicated that the most significant professional development needs included evaluation of programs, program planning, evaluation of teaching and learning, motivating staff, and staff evaluation (1976:48). In answer to the second question, statistically significant differences in individual variables highlighted the greatest needs as occurring in B.C. institutions, technical institutions, and small institutions to individuals who are female or who had little administrative or teaching experience, had no graduate training, or had applied science backgrounds (1976:52-53). The study concluded by stressing the need to individualize professional development activities to meet the needs of specific target groups.

A great deal of practical assistance was provided to this researcher through a detailed analysis of the study's administration by Dr. Konrad. He also made available complete documentation of questionnaires, covering letters and telephone narratives.

These four studies provided useful information for the development of the present study. The Delphi conducted by Dyck proved that the topic of environmental forces and education was a fruitful area for research. The Clarke and Coutts study showed that chief administrative officers could be successfully polled for an iterative study such as the Delphi. The doctoral dissertation by Berghofer supported this researcher's belief that the process of revising opinions had no particular value. And the study by Konrad *et al*. provided useful procedural data.

FEATURES AND LIMITATIONS OF THE PRESENT STUDY

After analyzing a number of Delphi and policy Delphi studies, the monitor attempted to incorporate as many positive features as possible into the design of this study. Specific methodological features of the study included:

1. A combination of informed judgements about the future with views pertaining to a specific policy area

2. Identification of opposing views

3. Anonymity of feedback while dealing with two sub-groups which might be politically at odds

4. Controlled communication permitting a clearer focus on theoretical issues not likely to be discussed in a meeting

5. No forced convergence or revision of opinions in the light of group norms; rather a progression to consider estimated major forces as applied to a specific policy area

6. Explanation of Reasons for Importance of forces selected rather than only exploring items of disagreement

7. Panel selection of total relevant population for the two sub-groups

8. Highlighting of issues and identification of possible impacts rather than searching for a "correct" answer

9. Efficient use of time of geographically dispersed respondents.

10. Final report to serve as input to future committee work

11. Possible pedagogical effect on panelists in future when considering environment-related policy decisions.

Process features of the study included:

1. Extensive research into the design of Delphis to strengthen the design of this study

2. An open-ended Round I questionnaire based on the expertness of the panel

3. Provision of blank space for general comments by panelists

4. Use of four-point rating scales to discourage a neutral stance

5. The inclusion of two copies of each questionnaire in the respondents' packages to provide a file copy and back-up for possible loss.

The major limitation in the study was seen as the use of a single study monitor rather than a design team. The summarizing and editorial quality of the study was limited by the knowledge and ability of one person. Due to the educational nature of the entire exercise, there seemed to be no solution to this problem.

SUMMARY

This chapter provided a detailed review of the methodology employed in this study, specifically, a variety of the Delphi method known as the policy Delphi. The Delphi method was discussed in general—definition, characteristics, history, and future. Then a variety of methodological issues which have arisen over the years were outlined, describing both advantages and disadvantages of the method which have been been recorded in the literature. Next, the policy Delphi was explored, followed by a review of Delphis in post-secondary education. Particular reference was made to four Delphi studies conducted in Alberta during the last decade which influenced the present study. Finally the features and limitations of the present study were outlined.

The next chapter provides an analysis of the specific research design and procedures employed in this study.

Chapter V

RESEARCH DESIGN AND PROCEDURES

This chapter describes the research design and the procedures employed in this study. The section on research design includes the statement of the problem and sub-problems, the focus of the study, research variables and panel selection and characteristics. The section on instrument development, data collection procedures, and analysis procedures addresses each of the three rounds of the study in turn.

RESEARCH DESIGN

Statement of the Problem

The central problems in this study were stated in the form of three questions:

1. What environmental forces are viewed by Alberta community college presidents and Alberta Advanced Education officials as likely to have a major impact on the development of Alberta community colleges in the eighties?

2. What impact do Alberta community college presidents and Alberta Advanced Education officials perceive these major environmental forces as likely to have on the development of policy in Alberta community colleges in the eighties?

3. What meta-policy propositions can be derived from these perceptions?

Sub-Problems

Of lesser significance, but likely to be available from the data generated to answer the questions posed in the statement of the problem, were answers to three additional questions:

1. Are the views of Alberta community college presidents and Alberta Advanced Education officials similar regarding the identification of the major environmental forces?

2. Are the views of Alberta community college presidents and Alberta Advanced Education officials similar regarding the influence that these major environmental forces will have on policy development?

3. Is the Delphi method a useful research methodology for analyzing a complex issue such as this?

The Focus of the Study

The particular focus of the study moved from a highly generalized to a quite specific field, viewing first of all the types of environmental forces perceived as likely to have a major impact on Alberta community colleges in the next decade, moving secondly to the identification of specific environmental forces, thirdly to the likely impact of these forces on the colleges; fourthly to the most influential environmental forces on a specific policy area, and finally to possible college responses in the light of the aforementioned.

Research Variables

Drawing from the theory of organizations and their environments, the research variables in the study were the environmental forces defined by Hall (1978) as comprising the general organizational environment; namely technological, legal, political, economic, demographic, ecological, and cultural forces:

1. Technological forces were viewed as technological advances and new methodologies which would be influential during the next decade in determining the future direction of Alberta's community colleges.

2. Legislative forces were viewed as federal and provincial

laws and aspects of the legal system which would be influential during the next decade in determining the future direction of Alberta's community colleges.

3. Political forces were viewed as aspects of the political process, political conditions or pressure groups which would be influential during the next decade in determining the future direction of Alberta's community colleges.

4. Economic forces were viewed as economic conditions which would be influential during the next decade in determining the future direction of Alberta's community colleges.

5. Demographic forces were viewed as the manner in which the number of people and their distribution would be influential during the next decade in determining the future direction of Alberta's community colleges.

6. Ecological forces were viewed as aspects both of the social systems in which organizations find themselves and of their physical environment which would be influential during the next decade in determining the future direction of Alberta's community colleges.

7. Cultural forces were viewed as norms, behaviours, and values which would be influential during the next decade in determining the future direction of Alberta's community colleges.

Panel Selection and Characteristics

The panel of respondents selected to participate in the study was comprised of two sub-panels.

The first sub-panel, referred to as Group 1 throughout, was made up of the ten community college presidents in the Alberta public college system. They were selected for their Janus-like position as boundary spanners—looking both inward to their institutions, and outward to the environment of their colleges, rather than for any authority or decision-making power. As Cohen and March so clearly pointed out in their study of American college presidents, "The presidency is an illusion" (1974:2) and the college is "a prototypic organized anarchy" (1974:3). They claimed that although presidents believe in comprehensive planning, they do not do it (1974:114) because long-range plans presume clarity of goals, an understanding of technology, and continuity of leadership. Colleges and universities have none of these and planning is generally restricted to capital, physical and fiscal areas. However, Cohen and March claimed that long-term plans served other purposes, as symbols, advertisements, games, and excuses for interaction (1974:114-115). These "political" motives are valid and in themselves could yield positive results and the educative process involved through participation in this Delphi study could be beneficial. Above all, however, the experience of viewing policy analysis from an environmental perspective and the data thus generated could provide useful input to future college-based policy decisions.

A glance at the profile of the college presidents provided in Table 1 reveals that their mean age was 49 (a range of 39 to 60) and the mean number of years they had been in their present position was 4.8 (a range of two and a half months to fourteen years), with a mean total number of years in postsecondary education of 15.3 (a range of 1 to 25 years). Their educational qualifications ranged from Bachelor to Doctorate. Only three presidents indicated that their specialization

Table

Profile of Panel Members

Sub-Panel	Sex		Age		Highest Educational Qualification				Years in Present Position		Years in Postsecondary Education	
	M	F	Mean	S.D.	Bachelor	Masters	Doctorate	Other	Mean	S.D.	Mean	S.D.
Group 1 College Presidents (N = 10)	10	0	49	6.8	5	1	4	0	4.9	5.1	15.3	7.6
Group 2 Government Officials (N = 7)	6	1	43[1]	6.6	0	0	6	1[2]	3.7	2.2	11.3	3.4

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[1] For age category, N = 6.

[2] Other qualification was a C.A.

was Educational Administration; the rest were split between humanities and physical sciences backgrounds.

The second sub-panel, referred to as Group 2 throughout, was comprised of seven senior officials in Alberta Advanced Education and Manpower, ranging from the Deputy Ministerial to the Directorship level, all with responsibilities in the area of community college education. They were selected mainly to provide dialogue in the policy Delphi study, in an attempt to identify opposing views regarding major environmental forces, should any exist. College representatives and government officials frequently appear to debate issues due to differing perspectives and it was hoped that this study might identify any major areas of disagreement.

The profile of government officials in Table 1 shows that their mean age was 43 (a range of 34 to 50), and the mean number of years in their present position was 3.7 (a range of 1 to 7 years), with a total number of years in postsecondary education of 11.3 (a range of 8 to 17 years). Their educational qualifications were grouped at the doctorate level, all but one in the area of Educational Administration. One member's highest qualification was that of Chartered Accountant.

In summary, a comparison of the two sub-panels shows that college presidents were older, had less education with less of it in Educational Administration, had been in their present position longer, and had more years of experience in postsecondary education. On the other hand, the government officials were younger, had more education, mainly in the field of Educational Administration, had been in their present position a shorter period of time, and had fewer years experience in postsecondary education, although still a substantial number.

RESEARCH PROCEDURES

A unique characteristic of the design of a Delphi study is that each questionnaire in the series is designed from the data received in the previous round. Therefore it is impossible to divorce instrument development from the procedures involved in data collection and analysis. As a result, each round of the study will be examined in turn, first looking at instrument development, then data collection procedures, and finally data analysis procedures. The final packages of materials used for the three rounds of the study are available in Appendices 1 to 3.

Round I

Instrument Development

An open-ended format was selected for the Round I questionnaire. Questions were formulated around the seven environmental components of Hall's typology (technological, legislative, political, economic, demographic, ecological and cultural forces). Specific forces of each type were requested along with the rationale for their selection.

Initial drafts of the questionnaire, Personal Data Sheet, and a letter of explanation were circulated for comment to thesis committee members and doctoral students in educational administration As a result of suggestions received, minor changes were made in the Personal Data Sheet, and the instructions accompanying the questionnaire were revised for clarity.

A second draft of the package of materials was reviewed by an expert in questionnaire construction. From his suggestions, examples of each environmental force were added as well as a sample response on the instructions sheet. In addition, a separate handout was prepared at this time which outlined the procedure involved in a policy Delphi, the rights of respondents, and a sample of questions from four rounds of a fictitious policy Delphi.

The third draft of the package of materials was then field tested on two local postsecondary institutional presidents not involved in the study. They were requested to rate the materials for clarity, lack of ambiguity, adequacy of content, and appropriateness of tone. A follow-up interview was held with each president for further comment and discussion. Both indicated that the tone and clarity of materials were adequate, but both encountered some ambiguity and one questioned the adequacy of the content while the other commented that the content was challenging.

The major problem both subjects identified was the overlap among the types of environmental forces. In particular, they felt that it was difficult to distinguish between Legislative and Political forces, and between Economic and Demographic forces. As one of them commented, "In theory, there may well be seven discrete forces— in actual practice these merge and are difficult to separate . . ." It was suggested that additional examples might aid in clarification of the forces.

Another problem experienced by both subjects was differentiating between Force and Rationale. A certain amount of self-doubt demonstrated by one of them was proof that the meaning of the terms was not clear enough.

Based on the comments of the subjects of the field test, the questionnaire was revised to request Forces and Reasons for Importance. Additional examples were added to clarify Legislative and Political forces. While the overlap among forces was evident, the study monitor felt that some framework was essential to aid in the analysis of the vast and complex topic of institutional environment. Therefore the seven types of forces outlined in Hall's Typology were retained.

The final version of the Round I package of materials was circulated on May 30, 1980. The package contained:

1. Covering Letter
2. Handout entitled, "What is a Policy Delphi?"
3. Personal Data Sheet
4. Round I Questionnaire entitled "Identification of Environmental Forces" (2 copies)
5. Self-addressed envelope.

The total time involved in developing the package was four weeks. A timetable of proposed and actual events occurring throughout the study is contained in Table 2.

Data Collection Procedures

Invitations to participate in the study were handled differently for the two sub-panels. All public college presidents were contacted in April through a letter to the Chairman of the Council of College Presidents containing a brief description of the proposed study. The matter was placed on the agenda of their April meeting and participation was approved.

Table 2

Proposed and Actual Timetable of Events
Policy Delphi, May 1-December 15, 1980

	Proposed	Actual
Round I		
Preparation	May 1-29	May 1-29
Dissemination	May 30	May 30
Reminders	June 15-21	June 15-July 17
Analysis	June 22-30	July 18-31
Total Time	8 weeks	13 weeks
Round II		
Preparation	July 1-30	August 1-14
Dissemination	July 31	August 15
Reminders	August 21-30	September 1-30
Analysis	September 1-7	October 1-7
Total Time	10 weeks	10 weeks
Round III		
Preparation	September 8-29	October 8-21
Dissemination	September 30	October 22
Reminders	October 15-21	October 17 - November 21
Analysis	October 22-31	November 17-28
Total Time	8 weeks	7 weeks
Round IV		
Preparation	November 1-7	
Dissemination	November 8	
Reminders	November 21-28	
Analysis	November 29-December 7	
Summary	December 8-15	
Total Time	6 weeks	

The sub-panel of Alberta Advanced Education and Manpower officials was drawn up after interviews with the two Assistant Deputy Ministers who provided appropriate names. The proposed members were then invited to participate by individual telephone calls on May 27. Five of the six accepted. The two Assistant Deputy Ministers had already indicated that they were ready to participate. The Deputy Minister, who was out of town when the other members were contacted, was later invited by letter. His participation was acknowledged by the return of a completed questionnaire.

Of the 18 questionnaires dispersed for Round I, 16 were returned. (Consult Table 3 for panelist participation throughout the study.) One Alberta Advanced Education and Manpower official later changed his mind and refused to be involved in the study. One college president resigned and the acting president returned an uncompleted questionnaire. Additional time was lost through the rerouting of a questionnaire to a former college president. Eventually the acting president in that position was sent an additional copy which he completed. One questionnaire was lost in the mail and had to be redone. In all, recovering the returns took three weeks longer than anticipated.

Data Analysis Procedures

Content analysis. Content analysis was described by Deese (1969:39) as a practical enterprise, "a collection of techniques for providing interpretations of texts and similar products." Its inferential nature was stressed by Holsti (1969:109) who defined the purpose of content analysis as making valid inferences from data.

Table 3

Panelist Participation
Rounds I-III

	Number of Acceptances	Completed Round I	Completed Round II	Completed Round III
Group 1	10	9	10	10
Group 2	8	7	7	7
Total	18	16	17	17

Krippendorff (1969:10) expanded on the notion that content analysis was both an art and a science by saying:

> the manner in which a source is delineated, which aspect of text is recorded, and how it is processed are matters of art. However, the conclusiveness of the inferential process and the factuality of the inferred content belong to the domain of a science of content analysis. The latter presupposes explicit notational constructs of the source.

A combination of qualitative and quantitative methods should be employed in content analysis. Qualitative methods include the inductive development of categories and summarizing. Standard categories have proved of little use for this type of analysis (Poole, 1959:213). As Holsti (1969:115) commented, "many of the most interesting and significant content-analysis studies . . . depend on categories developed specifically for the data and problem at hand." Summarizing an original text is highly selective and the problem remains of determining what portion of the analysis represents the source's point of view and what the analyst's.

The judgemental nature of the qualitative methods employed in content analysis is offset to a degree by rigorous quantitative techniques. These include frequency analysis, scaling, and contingency analysis (Holsti, 1969:113). Frequency analysis involves the statistical determination of what the content is, a straightforward counting procedure. Scaling or dimensional ordering applies a fixed value to content to place it in a graded series and can measure such properties as intensity or importance, numerosity, probability, length or position, or time (Deese, 1969:47). Contingency analysis correlates or resynthesizes content elements after their initial unitization. It frequently involves the development of an index or set of indices.

The content analysis procedures employed in this study were both qualitative and quantitative in nature. Round I analysis was basically qualitative, developing categories and summarizing responses. The procedure included:

1. Development of categories
    a. Unitization of comments
    b. Coding
    c. Sorting
    d. Determination of categories
    e. Resorting
2. Summarizing responses
    a. Determination of category descriptor
    b. Compilation of similar responses
    c. Editing of unique responses.

Each procedure is described in greater detail below.

Development of categories. Prior to the commencement of content analysis, each sheet of each questionnaire was coded with the panelist's code number. Then the questionnaires were photocopied and the originals reserved. All content analysis procedures were carried out on the photocopies.

Upon inspection of the returned questionnaires, it was discovered that not all panelists responded to all items. See Table 4 for an analysis of replies.

The first step in the development of categories was to unitize comments. This involved breaking down responses into topic units, those statements or portions of statements which reflected a

Table 4

Number of Respondents Replying to Each Force Type
(N = 16)

Type of Force	Number of Respondents
Technology	16
Legislation	16
Politics	16
Economics	16
Demographics	16
Ecology	14
Culture	13
Other	5
Additional Comments	1

single idea. An example of a response that was split into two units is reproduced below:

> ECONOMIC FORCES
>
> Force: Strong economic development in Alberta will lead to increasing in-migration from other provinces and abroad.
>
> Reason for Importance: A larger population base and potentially larger sources of demands on college services will develop. Immigration from abroad will yield requirement for special programming for new citizens who require enculturation.

The final sentence, regarding special programs for immigrants was considered a separate unit.

Secondly, the units were coded as to the type of force under which they originated in the respondents' questionnaires and the panelist's code number. The third step was to cut out each unit and sort according to type of force. Fourthly, the units in each group were scrutinized for similarities and categories were eventually determined which provided mutually exclusive and exhaustive classifications. Finally, the units were resorted into categories and reassembled on sheets of paper headed by each category.

Table 5 provides an analysis of the unit revision which occurred. From the table it is obvious that the most units were moved from Legislation and Ecology, while the most units were added to Politics and Culture. Specifically, twelve units were moved from Legislation to Politics, along with five from Ecology and four from the Other group. Seven units were moved from Ecology to Culture, along with three from Demography and five from Politics.

Table 5

Round I
Analysis of Unit Revision

Type of Force	Number of Units	Units Moved	Units Added	Deletions	Revised Number of Units
Technology	48	1	2	-	49
Legislation	43	14	1	2	28
Politics	48	5	21	1	63
Economics	38	3	4	1	38
Demographics	43	2	6	4	43
Ecology	27	15	5	1	16
Culture	26	2	12	-	36
Other	9	9	-	-	-
Total	282	51	51	9	273

An example of a unit that was moved from Legislation to Politics follows:

LEGISLATIVE FORCES

Force: Levels and Allocations of Provincial Operating and Capital Grants

Reason for Importance: Will determine the rate of growth in terms of programs and regional expansion.

As no specific legislation need be enacted in order for this to occur, it was deemed more appropriate as a Political Force.

An example of a unit that was moved from Ecology to Culture is reproduced below:

ECOLOGICAL FORCES

Force: The expectation of the community and the resources of the college should be used more in the development of solutions to community problems.

Reason for Importance: More demands on the time of college staff and facilities—hence their financial resources.

The monitor judged that the respondent was implying a Cultural Force of community involvement and so the item was moved. At the suggestion of two respondents, Cultural Forces was broadened to Cultural/Societal Forces.

Altogether, a total of nine units was discarded for reasons of vagueness or irrelevance. An example of a unit deleted because it was too vague for a clear understanding of meaning is:

LEGISLATIVE FORCES

Force: Government vs. institutional areas of control

Reason for Importance: (blank)

An example of a unit which was deleted due to irrelevance to the study is:

POLITICAL FORCES

Force: Internal politics

Reason for Importance: A successful college is in a state of dynamic equilibrium, balancing the overall goals of government and the board of governors, the aspirations of the faculty, and the needs of the students as seen by them.

While the study monitor did not quarrel with the idea in its own right, she determined that the concept of internal politics was irrelevant to the question at hand: specifically, community colleges and their external environment. Therefore, the item was deleted.

In addition to the development of categories of environmental forces, the categories themselves were then scrutinized and three macro-categories devised: Forces Relevant to Community Colleges; Forces Relevant to Education in General; and Forces Relevant to the General Environment. The environmental force types were then divided into these macro-categories.

Summarizing responses. The first step was to review responses in each category for similarities and differences. A descriptor for the force involved was determined whose meaning was similar to those submitted by respondents. The second step involved compiling similar Reasons for Importance into single statements, making every attempt to use as much of respondents' wording as possible. Finally, unique Reasons for Importance were reproduced in an edited form, again with care to adhere to respondents' style.

Below is an example of the procedure employed for summarizing responses. The category under Economic Forces was "Provincial Fiscal Restraint."

Response 1: Force: A government policy of fiscal restraint.

Reason for Importance: This creates a set of economic conditions within the colleges which will continue to be under pressure to increase efficiency and productivity.

Response 2: Force: Declining relative availability of funds.

Reason for Importance: Will put on pressure for increased productivity.

Response 3: Force: Limited provincial sources.

Reason for Importance: It will tend to limit the rate of growth and the availability of capital and operational dollars for the colleges.

Response 4: Force: Funding levels.

Reason for Importance: Affects priorities that can be met.

Response 5: Force: Increasing budget restrictions or cuts placed by provincial government.

Reason for Importance: Many colleges are already making staff and service cuts. These will obviously continue.

Response 6: Force: More accountability for expenditures.

Reason for Importance: Shift in priorities in government spending.

Response 7: Force: Excessive dependence on government grants will threaten college autonomy and independence.

Reason for Importance: (blank)

Response 8: Force: As the costs of post-secondary education rise, government will require colleges to move more towards a model of funding which will require them to act as businesses.

Reason for Importance: More of the institution's time (Boards, President, Senior Management) will be required for fund raising. This will lead to a different set of management responsibilities and fiscal policies at all levels of the college.

Response 9: Force: With the end of the era of huge transfers of public money to institutions, massive infusions of money will be made in the name of Catch-up or Start-up grounds. These will be for politically motivated activities such as safety, industry, and scientific research.

Reason for Importance: (moved to another category)

From these responses the Economic Force "Government Policy of Fiscal Restraint" was pulled. In compiling the Reasons for Importance, Responses 1, 2, and 6 were combined, Responses 3, 4, 5, and 9 were more or less reproduced, Response 7 was transposed from Force to Reason for Importance and reproduced, and Response 8 appeared in edited form.

The final summarized version of this category looked like this:

ECONOMIC FORCES

Force: Government policy of fiscal restraint.

Reasons for Importance:

Colleges will continue to be under pressure to increase efficiency and productivity.

Will limit rate of growth and availability of capital and operational dollars.

Affects priorities that can be met.

Continuation of staff and service cuts.

> Excessive dependence on government grants will threaten college autonomy.
>
> As colleges move toward a business model, more time will be required for fund raising. This will lead to a different set of management responsibilities and fiscal policies at all college levels.
>
> With the end of the era of huge transfers of public money to institutions, massive infusions of money will be made in the name of Catch-up or Start-up grounds. These will be for politically motivated activities such as safety, industry, and scientific research.

In all, a total of 273 units was compressed into 102 categories or Forces. These were divided among the seven major groupings of force types, based on Hall's typology. An analysis of the content from Round I in its final summarized format can be found in Table 6.

General Comments and Additional Comments were retained in their original form. They are available in Appendix 6.

Analysis time for Round I data was two weeks.

Round II

Instrument Development

The Round II instrument consisted of the 102 Forces with their summarized Reasons for Importance, grouped under the seven force types and including General Comments, accompanied by two four-point rating scales, Likelihood of Occurrence in the Next Decade, and Degree of Impact on Alberta's Community College System. A sheet of instructions was developed, as well as a detailed explanation of the rating scales, entitled "Rating Key."

A draft version of the Round II materials was field-tested on the same two local postsecondary presidents not involved in the study. They were requested to comment on appropriateness and usefulness of the Rating Key, clarity of instructions, length of time to complete, and

Table 6

Analysis of Content
Round I

Force Type	Revised Number of Units	Number of Forces
Technology	49	16
Legislation	28	16
Politics	63	25
Economics	38	15
Demographics	43	7
Ecology	16	6
Culture/Society	36	17
Total	273	102

particular problem areas. Both found the Rating Key appropriate and useful, the instructions clear, and indicated no problem areas. Time to complete the questionnaire varied from half an hour to an hour and a half. Both subjects had taken the suggestion in the instructions to complete the questionnaire in several short sittings. One of them occasionally experienced what he felt was a contradiction in judgement by rating a force 1 (high) for Likelihood and 4 (low) for Impact, although he admitted that this did reflect the situation from his perspective. The other experienced some frustration in that he agreed with the Force but not necessarily with all the Reasons for Importance. Both indicated a positive interest in the study and felt that it was going well.

The final version of the Round II materials was then compiled and circulated on August 15, 1980. The package contained:

1. Covering letter
2. Round II questionnaire entitled "Rating of Environmental Forces" (2 copies)
3. Rating Key
4. Self-addressed envelope.

The total time involved in developing the package, once Round I analysis was completed, was two weeks.

Data Collection Procedures

Of the seventeen questionnaires dispersed for Round II, all were returned. Two questionnaires were lost in the mail and file copies had to be procured. Despite telephone reminders, the total collection process again took three weeks longer than estimated.

Data Analysis Procedures

The majority of content analysis procedures employed in Round II were quantitative in nature: to determine and analyze the Major Environmental Forces; to analyze the impacts of these forces on the colleges; and to determine and analyze group differences. However, qualitative methods were used in the following activities: (1) To identify the Impacts and Tentative Impact Areas of the Major Environmental Forces in the colleges; and (2) To summarize major forces and their Tentative Impact Areas into a scenario.

Quantitative Methods

1. Scaling for Importance

a. Identification of Significance of Environmental Forces

A special program was devised to determine the relative significance of specific forces by computing the percentage of the total number of respondents who rated Likelihood and Impact as either 1 (Very Likely, High Impact) or 2 (Likely, Moderate Impact), for a total of four combinations.

b. Identification of Highly Significant Environmental Forces

Another program was devised to develop a list of Highly Significant Forces by computing the percentage of the total number of respondents who rated both Likelihood and Impact as 1 (Very Likely, High Impact).

c. Rank-ordering of Major Environmental Forces

The 16 major forces were rank-ordered for importance by assigning each a weight factor determined by taking the sum of one point per respondent who rated the force as Significant and one point per respondent who rated the force as Highly Significant.

d. Scaling of Items of Disagreement by Significance

The nine items of disagreement between the two sub-panels were scaled by the percentage of total respondents who had identified the forces as Significant.

2. Frequency Analysis

a. Determination of Frequency of Responses for Major Environ-Mental Forces

The analysis of the frequency of ratings for each force was computed by use of the Statistical Package for the Social Sciences (SPSS) program "Frequencies."

b. Determination of Frequency of Citation of Tentative Impact Areas

The frequency with which particular impact areas of the Major Environmental Forces were cited under Reasons for Importance was analyzed by counting procedures.

c. Identification of Group Differences

In order to compare the responses of Group 1 (College Presidents) and Group 2 (Government Officials), the SPSS program "t-Test" was used. As a result, significant differences between the two groups for both Likelihood and Impact were identified at the .05 level.

d. Determination of Frequency of Additional and General Comments by Category

The frequency of Additional and General Comments by the categories of content-related and study-related was determined by counting procedures.

3. Contingency Analysis

a. Determination of Major Environmental Forces

The Major Environmental Forces were determined by correlating those forces which appeared on both the Significant and Highly Significant lists of environmental forces.

b. Correlation of Major Environmental Forces with Hall's Typology

The Major Environmental Forces were correlated by category of force type with Hall's Typology.

c. Correlation of Major Environmental Forces with Outcomes Suggested

The Major Environmental Forces were correlated with the Outcomes Suggested which had been summarized from the Reasons for Importance in Round I.

d. Correlation of Items of Disagreement with the Major Environmental Forces.

The items of disagreement between the two sub-panels were correlated with the rank-ordered list of Major Environmental Forces.

e. Correlation of Items of Disagreement with Hall's Typology

The items of disagreement between the two sub-panels were correlated by category of force type with Hall's Typology.

Qualitative Methods

1. Development of Categories

a. Identification of Impacts

The Reasons for Importance given in Round I for the Major Environmental Forces identified in Round II were analyzed for impacts on the colleges and divided into two major categories.

b. Identification of Tentative Impact Areas

The Outcome Suggestions were analyzed for types of predicted change and ten Tentative Impact Areas of the colleges were determined.

c. Analysis of Additional and General Comments

Additional and General Comments were analyzed and divided into two categories: those related to the content of the study; and those related to the administration of the study.

2. Summarizing

a. Development of Outcomes Suggested

The Outcomes Suggested for each of the Major Environmental Forces were summarized from the Reasons for Importance stated in Round 1.

b. Development of a Scenario

Major Environmental Forces and their impacts on the colleges were summarized into paragraph form in a scenario.

Analysis time for Round II data was one week.

Round III

Instrument Development

Due to the time lag which had occurred to this point in the study, it was evident that four rounds could not be completed within the time allotted; therefore, it was determined to complete the study with Round III.

Several versions of a Round III questionnaire were then considered, including cross-impact analysis, scenario writing, and policy analysis. The criteria which had to be met by a Round III questionnaire included expediency, clarity, and adherence to the initial purpose of the study, namely the identification of major environmental forces and their projected impact on college policy development. A policy analysis format was determined the most appropriate medium for achieving these ends.

As indicated above, a list of 16 major environmental forces had been developed from the data provided in Round II in the following manner:

1. Identification of Significant Forces

Twenty-two forces were identified as significant by over 80% of panelists who rated both Likelihood as either 1 or 2 (1 = Very Likely, 2 = Likely) and Impact as either 1 or 2 (1 = High Impact, 2 = Moderate Impact). All responses of 3 or 4 for either Likelihood (3 = Not Likely, 4 = Very Unlikely) or Impact (3 = Low Impact, 4 = No Impact) were deleted.

2. Identification of Highly Significant Forces

A separate list of twenty-two forces was identified as highly significant by over 25% of panelists who rated both Likelihood and Impact as 1 (Very Likely, High Impact).

3. Identification of Major Environmental Forces

Sixteen forces were identified as appearing in both the Significant and the Highly Significant categories outlined above.

4. Rank Ordering of Major Environmental Forces

A weighting factor was derived for each of the sixteen Major Environmental Forces by taking the sum of one point for each of the total number of respondents who indicated that the force was Significant and one point for each of the total number of respondents who indicated that the force was Highly Significant. The forces were then rank ordered into eight categories of decreasing significance, with one force in each of the first three categories, three in the fourth category, three in the fifth category, four in the sixth category, one in the seventh category, and two in the eighth category.

A questionnaire was then devised to analyze policy implications related to the Major Environmental Force which was rank ordered as the most important by respondents, namely the "Technological Demand for Training and Retraining." A format was designed to enable panelists to consider the possible impacts of the other fifteen Major Environmental Forces on possible policy developments relating specifically to this most important issue. Panelists were asked to rate the influence in the next decade of each environmental force on future policy decisions to be made in response to the increasing need for technological training and retraining on a four-point scale for Influence. In addition, they were requested to suggest possible ways that colleges could adjust to each environmental force when considering future policy in the specific area of technological training and retraining. As usual, additional space was left for comments.

A detailed Rating Key for Influence was developed, along with a summary sheet of Round II findings listing the sixteen Major Environmental Forces. A covering letter was drafted.

Due to time constraints and prior commitments on the part of one of the subjects, it was decided to omit the field-testing phase. Instead, the draft package of materials was critiqued by the monitor's advisor and one independent observer. Suggestions by them resulted in a clarification of instructions and change in phrasing from "Technological Demand for Training and Retraining" to "Technological Training and Retraining."

The final version of Round III materials was then compiled and circulated on October 22, 1980. The package contained:

1. Covering letter
2. Round III questionnaire entitled "Policy Analysis" (2 copies)
3. Rating Key
4. Rank ordered list of Major Environmental Forces as identified in Round II
5. Self-addressed envelope.

The total time involved in developing the package, once Round II analysis was completed, was two weeks.

Data Collection Procedures

All 17 questionnaires dispersed for Round III were returned. In an effort to speed the collection time, the questionnaires sent to Alberta Advanced Education and Manpower were picked up personally by the study monitor at a prearranged time following telephone reminders. Six of the seven questionnaires in Group 2 were obtained in this way and the seventh was collected a week later. To encourage the quick return of out-of-town questionnaires, telephone reminders began within a week after they had been disbursed. Also, to avoid mail losses, panelists were encouraged to return their questionnaires by Special Delivery. Further telephone calls were necessary in several cases and the collection process took two weeks longer than anticipated.

Data Analysis Procedures

Data analysis procedures employed in Round III were similar to those used in the first two rounds. Quantitative methods like those in Round II involving scaling for importance, frequency analysis, and contingency analysis were used to determine and analyze the Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, to analyze Possible College Adjustments, and to determine and analyze group differences. Qualitative methods similar to those employed in Round I were used to categorize Possible College Adjustments and to summarize responses. Specific procedures are outlined briefly below.

Quantitative Methods

1. Scaling for Importance

a. Rank Ordering of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade

The forces were ranked by percentage ratings of both 1 (High Influence) and 2 (Moderate Influence) and 1 (High Influence) alone.

b. Rank Ordering of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade by Weight

The forces were ranked by a weighting factor which was derived by taking the sum of one point per respondent who rated each force as 1 or 2 and one point per respondent who rated the force as 1.

c. Rank Ordering of Impact Areas

The Impact Areas were ranked according to the percentage of total responses each received.

2. Frequency Analysis

a. Determination of Frequency of Responses of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade and of Possible College Adjustments

The frequency with which responses of 1 through 4 for Influence and the number of responses for Possible College Adjustments were analyzed by simple counting procedures, as were the number of respondents who replied to each item.

b. Determination of Frequency of Citation of Possible College Adjustments

The frequency with which particular suggestions were cited as Possible College Adjustments was analyzed by counting procedures.

c. Determination of Frequency of Specific and General Comments

The frequency of Specific Comments per force type and of General Comments per category were determined by counting procedures.

d. Identification of Group Differences

To compare the responses of Group 1 (College Presidents) and Group 2 (Government Officials) regarding Influence, the SPSS program "t-Test" was used. Significant differences were identified at the .05 level.

3. Contingency Analysis

a. Comparison of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade by Percentages and Weight.

The three lists of Influential Forces developed in la and b above were compared for relative placement of forces.

b. Comparison of Rank Order of Forces in Rounds II and III

The rank-ordered Major Environmental Forces determined in Round II were compared with the rank-ordered Influential Forces rated in Round III for relative placement of forces.

c. Correlation of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining with Hall's Typology

The forces were correlated by force type with Hall's Typology.

d. Comparison of Hall's Typology in Rounds II and III

The rank order of forces by weight according to Hall's Typology was compared for Rounds II and III.

e. Correlation of Tentative Impact Areas of Major Environmental Forces, Round II with Impact Areas, Round III

The Tentative Impact Areas determined in Round II were correlated with the Adjustment Areas suggested in Round III by topic similarity.

f. Correlation of Impact Areas with Possible College Adjustments

The Impact Areas as determined in Round III were correlated with the summarized statements of Possible College Adjustments.

g. Comparison of Specific, Additional, and General Comments by Round

The Specific, Additional, and General Comments made by panelists for Rounds I-III were compared by frequency.

Qualitative Methods

1. Development of Categories

Categories for Possible College Adjustments were developed in a similar fashion to the categories of environmental forces developed in Round 1. The procedure included:

a. Unitization of comments

b. Coding

c. Sorting

d. Determination of categories

e. Resorting.

Comments were first broken down into topic units reflecting a single idea. An example of a comment which was split into two units is reproduced below:

> #2 Intensified Development of the Resource Industry and Technological Training and Retraining
>
> Possible College Adjustment: This is more important in the regions most affected. They need to work closely with government and industry on planning.

This comment was deemed to have dealt with both liaison with industry and liaison with government and so was split into two units.

Secondly, the units were coded according to questionnaire item and panelist's code number. The third step was to cut out each unit and sort by questionnaire item. Fourthly, the units in each group were scrutinized for similarities and tentative Adjustment Area categories developed. The fifth step was to resort the units by Adjustment Areas, revising the category titles as required.

While the number of comments that were split was not significant, there were 22 referral responses, as mentioned above, where responses were repeated verbatim or the monitor was simply directed to see another questionnaire item for the response.

In addition, a certain number of deletions was inevitable (see Table 7). In all, 10 responses were deleted for the following reasons: lack of clarity (8 deletions), illegibility (1 deletion), and insufficient information (1 deletion). An example of a comment deleted for lack of clarity was:

#15 A Different Student Population and Technological Training and Retraining

Possible College Adjustment: If students are more mature, different approaches may be necessary.

A comment which was deleted because it was judged to provide insufficient information was:

#8 Regional Expansion of Population and Technological Training and Retraining

Possible College Adjustment: Encourage it.

2. Summarizing Responses

The first step in the procedure of summarizing responses was to review responses in each category for similarities and differences. Secondly, similar responses were compiled into single statements. A demonstration of this summarizing process for similar responses related to the Impact Area, "Programming" follows:

#1 A Growing Alberta Population and Technological Training and Retraining

Possible College Adjustments: Response 1—More imaginative programs and courses.

Response 2—Utilize innovative instructional methods and devices.

Table 7

Possible College Adjustments—Responses and Deletions, Round III

Environmental Force Coupled with Technological Training and Retraining	Number of Responses	Number of Deletions	Number of Usable Responses
1. Growing Alberta Population	35	1	34
2. Intensified Development of Resource Industry	35	0	35
3. Inflation	28	0	28
4. Industry as a Pressure Group	20	2	18
5. Increasing In-migration	28	2	26
6. Buoyant Economy	19	0	19
7. Decentralization of College Services by Region	22	0	22
8. Regional Expansion of Population	24	2	22
9. Faculty as a Pressure Group	22	0	22
10. Government Policy of Fiscal Restraint	20	0	20
11. Industrial Expansion	17	0	17
12. Computer Technology	24	0	24
13. Growth in Service Sector	18	0	18
14. Government Priorities among All Sectors	17	1	16
15. Different Student Population	32	2	30
Total	361	10	351

#2 The Intensified Development of the Resource Industry and Technological Training and Retraining

Possible College Adjustments:

Response 3—Development of new courses and programs.

Response 4—Development of new programming.

Response 5—Increase in program diversity.

Response 6—Modern design of programming.

Response 7—Concentrate on programs tailored to industry's needs.

Response 8—Continued and increased emphasis on trade and technology training.

Response 9—Expand/implement trade, technology programs (referral response).

Response 10—Increase sophistication in techniques with new programs.

#6 A Buoyant Economy and Technological Training and Retraining

Possible College Adjustments:

Response 11—Program-review priorities at each college.

Response 12—Provide marketable skills.

#7 Decentralization of College Services by Region and Technological Training and Retraining

Possible College Adjustment:

Response 13—Meeting the expectations of minority and other interest groups.

#8 Regional Expansion of the Population and Technological Training and Retraining

Possible College Adjustment:

Response 14—More imaginative programs and courses (referral response).

#11 Industrial Expansion and Technological Training and Retraining

Possible College Adjustments:

Response 15—Accommodate in programming.

Response 16—If diversified industry, must assess types of new programs which may be necessary.

Response 17—Assess requirements for new programs.

Response 18—Diversified support facilities for ongoing special programs.

Response 19—Expand/implement trade, technology programs.

Response 20—Increase training in business and industry.

Response 21—Increase retraining capabilities.

Response 22—Adjust programs and quantity to type and degree of industrial expansion.

From these responses, the following statement was derived:

> Programming: Assess requirements in industry and develop innovative courses and programs to provide training and retraining in marketable skills.

Not all categories contained so many responses. Frequently unique items were simply edited, clarified, or reproduced.

In all, 351 units were compressed into 79 categories or Possible College Adjustments, divided among 12 Impact Areas.

Specific and General Comments were retained in their original form.

Analysis time for Round III data was two weeks.

SUMMARY

This chapter outlined the research design for this study and the procedures employed in instrument development, data collection, and data analysis.

In the first section on research design, the problem statements and sub-problems were outlined and the study's focus explained. Research variables were considered and the selection and characteristics of the panelists were reviewed in detail.

Due to the unique nature of the Delphi process, instrument development and procedures for data collection and analysis were explained for each round of the study in turn.

The section on Round I explained the process involved in the development of the first instrument and the data collection procedures. In addition, qualitative and quantitative methods of content analysis were discussed in general terms and then the particular qualitative methods employed in Round I were outlined and relevant examples were cited.

The section on Round II discussed instrument development, data collection procedures, and provided a detailed description of both the quantitative and qualitative methods of content analysis employed in analyzing the data.

The section on Round III also reviewed instrument development, data collection procedures, and described the quantitative and qualitative methods of content analysis used to analyze the data, providing examples of the qualitative analysis.

The next chapter is devoted to a detailed analysis of the data collected in this study.

Chapter VI

DESCRIPTION AND ANALYSIS OF DATA

INTRODUCTION

As stated earlier, the central purpose of this study was threefold: to determine what environmental forces were viewed by college presidents and Alberta Advanced Education and Manpower officials as likely to have a major impact on the development of Alberta community colleges in the eighties; to discover what impact these groups believed the identified forces would have in the development of policy; and to derive some meta-policy propositions from their perceptions.

In order to best analyze the data procured during the course of the study, they will be examined sequentially, round by round. Each section will provide an overview of the purpose of the round and a brief description of the questionnaire, followed by a description of the data generated and an analysis of the findings. Finally, a summary of the findings will be presented.

In addition to the central problems of the study referred to above, there were three sub-problems. The first two dealt with sub-group differences and will be addressed for Round II and Round III in turn.

Then the Specific, Additional, and General Comments appended by panelists to the questionnaires will be analyzed for each of the three rounds.

Lastly, the findings of the study will be reviewed.

ROUND I

Overview

The purpose of Round I was to have respondents identify environmental forces which they regarded as likely to have an impact on the development of Alberta's community colleges in the eighties.

Panelists were provided with open-ended statements regarding each of seven different categories of environmental forces (Technology, Legislation, Politics, Economics, Demography, Ecology, and Culture). They were asked to identify environmental forces which were or would become influential in the next decade in determining the future direction of Alberta's community colleges. Three responses for each category were suggested as a guideline. In addition, respondents were requested to support each force they selected with a reason for its importance. Space was provided for the addition of another category, as well as for general comments.

Description of Data

Once collated and summarized by the procedures outlined in Chapter V, the data received in Round I consisted of a list of 102 environmental forces with supporting reasons for importance for each divided among seven categories. Consult Table 8 for a list of Forces, number of Reasons for Importance, and number of respondents who provided them. In addition, a complete list of Forces with their Reasons for Importance is provided in Appendix 2 in the Round II questionnaire.

Table 8

Environmental Forces, Round I, with Number of Reasons for Importance and Number of Respondents

Force	Number of Reasons for Importance	Number of Respondents
I. TECHNOLOGICAL		
1. Technological Demand for Training and Retraining	5	7
2. Development of New Sources of Energy	2	5
3. Tar Sands Technology	4	2
4. Medical Technology	1	1
5. Computer Technology	3	4
6. The Market for Qualified Instructors	1	1
7. Satellite Communications	6	9
8. Cable TV	4	3
9. Television	1	1
10. Conference Telephone	2	1
11. Fibre Optics	2	1
12. Technological Advances in Teaching Modes	7	9
13. Improved Data Storage and Retrieval	4	5
14. Word Processing	1	1
15. Advances in Learning Theory	3	1
16. Increased Utilization of Natural Renewable Resources	1	1
II. LEGISLATIVE		
1. Revisions to the Colleges Act	3	4
2. Legislation Assuring Equal Access to Postsecondary Education for all Albertans	1	1
3. Increased Statutory Rights for the Disadvantaged	4	4
4. Changes in Human Rights Legislation	2	1

Table 8 (continued)

Force	Number of Reasons for Importance	Number of Respondents
5. Constitutional Reform re: Treaty Indians	3	3
6. Financial Administration Act or Equivalent	2	2
7. Increased Student Aid	1	1
8. Professions and Occupations Legislation	2	2
9. Changes in Apprenticeship Legislation	1	1
10. Changes in Federal-Provincial Agreements re: Postsecondary Education	2	3
11. Legislation re: Community Use of Institutional Facilities	2	1
12. Legislation re: Copyright for Both Printed and Visual Materials	1	1
13. Creation of a Foundation for Research and Innovation in Education	1	1
14. Legal Permissability of Private Educational Concerns	1	1
15. Legislation to Permit Industry to Fund Release Time for More Educational Opportunities for Workers	3	1
16. Legislation to Provide a Guaranteed Income	2	1
III. POLITICAL		
1. Increased Political Turbulence in the Third World	3	3
2. Desire of Third World Nations for a Higher Level of Postsecondary Education	2	2
3. Growth in Awareness of Alberta's Interdependence with the Rest of the World	1	1

Table 8 (continued)

	Force	Number of Reasons for Importance	Number of Respondents
4.	Direction of Postsecondary Education in the U.S. and Ontario	1	1
5.	Jurisdictional Disputes over Resources between Federal and Provincial Governments	1	1
6.	Federal Insistance that Provinces Pay a Greater Share of the Cost of Postsecondary Education	2	2
7.	Dissatisfaction with Confederation	1	1
8.	Jurisdictional Disputes over Establishment of National Standards for Professions and Trades	1	1
9.	The Council of Provincial Ministers of Education	1	1
10.	Continuing Dominance of the Progressive Conservatives	4	5
11.	Government Priorities among All Sectors	6	4
12.	Government Priorities within the Area of Education	3	3
13.	Strained College-University Relations	2	2
14.	Decentralization of College Services by Region	1	2
15.	Faculty as a Pressure Group	8	7
16.	Board of Governors as a Pressure Group	2	2
17.	Civil Servants as a Pressure Group	3	3
18.	Taxpayers as a Pressure Group	3	2
19.	Politicians as a Pressure Group	1	1
20.	Labour Unions as a Pressure Group	2	1
21.	Community as a Pressure Group	5	6
22.	Industry as a Pressure Group	9	6
23.	Native Groups as Pressure Groups	2	3

Table 8 (continued)

Force	Number of Reasons for Importance	Number of Respondents
24. New Canadians as a Pressure Group	1	1
25. Militant Groups as Pressure Groups	1	1
IV. ECONOMIC		
1. Government Policy of Fiscal Restraint	7	10
2. Inflation	4	6
3. Buoyant Economy	4	3
4. Industrial Expansion	4	3
5. Growth in Service Sector	1	2
6. Intensified Development of Resource Industry	6	6
7. Cost of Education	3	2
8. Changing Patterns of Remuneration	1	1
9. Bilateral Trade Agreements between Alberta and Foreign Countries	1	1
10. Private Sector Funding Increase	2	1
11. Increased Regulation by Federal and Provincial Governments of Economy	1	1
12. Increased Disposable Income	1	1
13. Booming Construction Industry	1	1
14. Heritage Trust Fund	1	1
15. World-wide Economic Depression	1	1
V. DEMOGRAPHIC		
1. Growing Alberta Population	6	11
2. Increasing In-migration	6	5
3. Aging Population	7	9
4. Urbanization	4	4

Table 8 (continued)

Force	Number of Reasons for Importance	Number of Respondents
5. Regional Expansion	5	7
6. More Women in the Labour Force	4	4
7. Immigration	6	10
VI. ECOLOGICAL		
1. Environmental Control	5	6
2. Articulation of Postsecondary Institutions	4	5
3. Increased Leisure Time-Strain on Recreational Land	1	1
4. Reduction in Private Transport	1	1
5. Decrease in Land Available for Single Family Housing	1	1
6. The Physical Location of the Colleges	1	1
VII. CULTURAL/SOCIETAL		
1. High Mobility	2	2
2. Fragmentation of the Family Unit	2	4
3. Increased Leisure Time Creating More Demand for General Interest Courses	4	4
4. The Value of Education	5	5
5. Changing Role of Women	2	3
6. Multiculturalism	2	2
7. Democratization of Decision Making	6	4
8. Community Demands on the Colleges	1	1
9. Increased Public Service as Employment Area	1	1
10. Changing Attitudes		
a. Different Student Population	-	1
b. Shift in Educational Priorities toward "People Needs"	-	1

Table 8 (continued)

Force	Number of Reasons for Importance	Number of Respondents
c. Churches Regaining Social and Educational Functions	-	1
d. New Freedom in a Conservative Atmosphere	-	1
e. Citizen Services by Colleges	-	1
f. Questioning Traditional Values	-	1
g. Diversified Clientele	-	1
h. Change Causing Social and Psychological Casualties	-	1

Analysis of Data

Identification of Environmental Forces

While all panelists (N = 16) provided suggestions for Technological, Legislative, Political, Economic, and Demographic Forces, only 14 responded to Ecological Forces, 13 to Cultural Forces, and 5 to the Other category (see Table 4 in Chapter V). The study monitor was unable to determine if the drop-off was caused by questionnaire fatigue, or as one of the subjects of the field test had indicated, by a feeling of repetition, or perhaps by other unknown factors.

In addition, despite attempts to clarify the differences between Legislative and Political Forces, some respondents demonstrated confusion: 14 units were removed from Legislation and 21 added to Politics (see Table 5 in Chapter V). Also the definitions for Ecological and Cultural Forces appeared unclear: 15 units were removed from Ecology and 12 added to Culture although many of these were added once the category was broadened to Cultural/Societal Forces. Due to the overlapping nature of many forces identified in the study, a number of changes were made simply to provide editorial consistency.

Overall, the most agreement regarding identification of forces occurred in the Demographic category, while the least agreement was found in the Ecological category (Table 8).

A summary of Environmental Forces by area of relevance, i.e., related specifically to the community college, or to education in general, or to the general environment, is located in Table 9.

Table 9

Summary of Environmental Forces, Round I by Area of Relevance

Type of Force	Relevant to Community Colleges	Relevant to Education in General	Relevant to General Environment	Other
Technological	4	0	12	0
Legislative	8	4	4	0
Political	6	2	6	11[1]
Economic	3	0	12	0
Demographic	0	0	7	0
Ecological	2	0	4	0
Cultural/Social	9	0	8	0
Total	32	6	53	11

[1] Pressure groups.

Of a total of 16 Technological Forces, 4 related directly to the community college: Technological Demand for Training and Retraining; The Market for Qualified Instructors; Technological Advances in Teaching Modes; and Advances in Learning Theory; while the rest related to the general environment. Three referred to the world of business: Conference Telephone; Improved Data Storage and Retrieval; and Word Processing. The remaining nine forces divided into general technological advances: Development of New Sources of Energy; Tar Sands Technology; Medical Technology; Computer Technology; and Increased Utilization of Natural Renewable Resources; and specific advances in the field of communications: Satellite Communications; Cable TV; Television; and Fibre Optics.

Of the 16 Legislative Forces suggested, 8 had direct bearing on the community college system: Revisions to the Colleges Act; Legislation Assuring Equal Access to Postsecondary Education for all Albertans; Increased Student Aid; Professions and Occupations Legislation; Changes in Apprenticeship Legislation; Changes in Federal-Provincial Agreements re: Postsecondary Education; Legal Permissability of Private Educational Concerns; and Legislation to Permit Industry to Fund Release Time for More Educational Opportunities for Workers. Four forces related more generally to the field of education: Legislation re: Community Use of Institutional Facilities; Creation of a Foundation for Research and Innovation in Education; Increased Statutory Rights for the Disadvantaged; and Legislation re: Copyright for both Printed and Visual Materials. The remaining four forces related to the general environment of the eighties: Changes in Human Rights Legislation; Constitutional Reform re: Treaty Indians; Financial Administration Act or Equivalent; and Legislation to Provide a Guaranteed Income.

Twenty-five Political Forces were identified. Six of these related specifically to community colleges: Desire of Third World Nations for a Higher Level of Postsecondary Education; Direction of Postsecondary Education in the U.S. and Ontario; Federal Insistance that Provinces Pay a Greater Share of the Cost of Postsecondary Education; Jurisdictional Disputes over Establishment of National Standards for Professions and Trades; Strained College-University Relations; and Decentralization of College Services by Region. Only two forces related to the general field of education: The Council of Provincial Ministers of Education; and Government Priorities within the Area of Education. Six forces related to the general environment: Increased Political Turbulence in the Third World; Growth in Awareness of Alberta's Interdependence with the Rest of the World; Jurisdictional Disputes over Resources between Federal and Provincial Governments; Dissatisfaction with Confederation; Continuing Dominance of the Progressive Conservatives; and Government Priorities among All Sectors. The remaining group of 11 forces consisted of a list of pressure groups which might influence postsecondary education: two of these groups actually existed, at least partially, inside the colleges themselves: Faculty and Boards of Governors; the rest were forces in the colleges' environment: Civil Servants; Taxpayers; Politicians; Labour Unions; Community; Industry; Native Groups, New Canadians; and Militant Groups.

There were 15 Economic Forces identified. Only three of these were of specific relevance to community colleges: Government Policy of Fiscal Restraint; the Cost of Education; and Private Sector Funding Increase. The remaining 12 forces were of a general environmental nature: Inflation; Buoyant Economy; Industrial Expansion; Growth in Service Sector; Intensified Development of Resource Industry; Changing Patterns of Remuneration; Bilateral Trade Agreements between Alberta and Foreign Countries; Increased Regulation by Federal and Provincial Governments of Economy; Increased Disposable Income; Booming Construction Industry; Heritage Trust Fund; and World-wide Economic Depression.

All seven Demographic Forces were of a general environmental nature. Three related to absolute increases in Alberta's population: Growing Alberta Population; Increasing In-migration; and Immigration. Two forces related to movement within the province: Urbanization; and Regional Expansion. And two referred to the changing nature of the workforce: Aging Population; and More Women in the Labour Force.

Of the six Ecological Factors identified, two related specifically to community colleges: Articulation of Postsecondary Institutions; and the Physical Location of the Colleges. The remaining four were of a general environmental nature: Environmental Control; Increased Leisure Time Placing a Strain on Recreational Land; Reduction in Private Transport; and Decrease in Land Available for Single Family Housing.

Seventeen Cultural/Societal Forces were suggested. Nine of these related to the area of community colleges: Increased Leisure

Time Creating More Demand for General Interest Courses; The Value of Education; Community Demands on the Colleges; Increased Public Service as an Employment Area; Different Student Population; Shift in Educational Priorities toward "People Needs"; Churches Regaining Social and Educational Functions; Citizen Services by the Colleges; and Diversified Clientele. Eight forces related more to the general environment: High Mobility; Fragmentation of the Family Unit; Changing Role of Women; Multiculturalism; Democratization of Decision Making; New Freedom in a Conservative Atmosphere; Questioning Traditional Values; and Change Causing Social and Psychological Casualties.

Reasons for Importance Given

The Reasons for Importance cited by respondents for the 102 Environmental Forces number 258 in all (see Table 10). Almost without exception, the supporting arguments given for the importance of each force related to its probable impact on the colleges, either directly, such as programming changes, or indirectly, such as influences on the government of Alberta which would then have an impact on the college system.

In no case was the list of reasons exhaustive, nor did it necessarily include the most important reasons supporting the argument for each force's significance; it did, however, represent the spectrum of opinions given by panelists who had considered the force important.

The Reasons for Importance were then included in the Round II questionnaire to clarify and support each force as it was being rated for Likelihood and Degree of Impact.

Table 10

Number of Environmental Forces and Reasons for Importance, Round I

Force Type	Number of Forces	Number of Reasons for Importance
Technology	16	47
Legislation	16	31
Politics	25	66
Economics	15	38
Demographics	7	38
Ecology	6	13
Culture/Society	17	25
Total	102	258

Summary of Findings

The purpose of Round I was to identify environmental forces likely to have an impact on Alberta's community colleges in the next decade along with supporting reasons for importance in each case. A total of 102 Environmental Forces was submitted along with 258 Reasons for Importance. The largest number of forces identified in any category occurred in Political Forces (25), followed by Cultural/Societal Forces (17), Technological and Legislative Forces (16 each), Economic Forces (15), Demographic Forces (7) and Ecological Forces (6). The largest number of Reasons for Importance given were also for Political Forces (66), followed by Technological Forces (47), Economic and Demographic Forces (38 each), Legislative Forces (31), Cultural/Societal Forces (25), and Ecological Forces (13). The most agreement regarding identification of forces occurred in the Demographic category, while the least agreement occurred in the Ecological category. The largest number of similar forces identified, 53 in all, related to the general environment, while 32 were directly relevant to community colleges, 11 represented pressure groups, and 6 related to education in general. Nearly all of the Reasons for Importance submitted by panelists in support of the forces identified related to the direct or indirect impact of these forces on the colleges.

ROUND II

Overview

The purpose of Round II was to have respondents rate the Environmental Forces identified in Round I on two four-point scales: Likelihood of Occurrence in the Next Decade; and Degree of Impact on Alberta's Community College System.

Respondents were provided with the comprehensive list of Forces along with their Reasons for Importance. Additional space for comments was provided.

Description of Data

The data received in Round II were analyzed to determine the relative significance of specific forces. This was accomplished by computing the percentage of the total number of respondents who rated both Likelihood and Impact as either 1 (Very Likely, High Impact) or 2 (Likely, Moderate Impact). A complete list of forces, ordered according to their significance thus determined can be found in Table 11.

Analysis of Data

The instructions and purpose of the questionnaire seemed to be clear as no problems emerged in its completion. All panelists (N = 17) completed their questionnaire, although occasional items were omitted. In addition, many added comments in the margin as they proceeded.

Table 11

Significance[1] of Environmental Forces, Round II

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Intensified Development of Resource Industry	63	E6	17	100
Faculty as a Pressure Group	47	P15	16	94.12
Buoyant Economy	60	E3	16	94.12
Technological Demand for Training and Retraining	1	T1	16	94.12
Growing Alberta Population	73	D1	16	94.12
Government Policy of Fiscal Restraint	58	E1	15	88.24
Inflation	59	E2	15	88.24
Decentralization of College Services by Region	46	P14	15	88.24
Industrial Expansion	61	E4	15	88.24
Growth in Service Sector	62	E5	15	88.24
Computer Technology	5	T5	15	88.24
Industry as a Pressure Group	54	P22	15	88.24
Increasing In-migration	74	D2	15	88.24
Regional Expansion of Population	77	D5	15	88.24
More Women in the Labour Force	78	D6	15	88.24
Civil Servants as a Pressure Group	49	P17	14	82.35
Taxpayers as a Pressure Group	50	P18	14	82.35
Government Priorities among All Sectors	43	P11	14	82.35
Cost of Education	64	E7	14	82.35
Fragmentation of the Family Unit	87	C/S2	14	82.35
Changing Role of Women	90	C/S5	14	82.35
Different Student Population	95	C/S10(a)	14	82.35
The Market Rate for Qualified Instructors	6	T6	13	76.47

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Table 11[1] (continued)

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Satellite Communications	7	T7	13	76.47
Aging Population	75	D3	13	76.47
Urbanization	76	D4	13	76.47
Boards of Governors as Pressure Groups	48	P16	13	76.47
Improved Data Storage and Retrieval	13	T13	13	76.47
Articulation of Postsecondary Institutions	81	EC2	13	76.47
Tarsands Technology	3	T3	13	76.47
Community as a Pressure Group	53	P21	13	76.47
Government Priorities within the Area of Education	44	P12	13	76.47
Community Service by Colleges	99	C/S10e	13	76.47
The Value of Education	89	C/S4	12	70.59
Jurisdictional Disputes over Resources between Federal and Provincial Governments	37	P5	12	70.59
Immigration	79	D7	12	70.59
Increased Leisure Time Creating More Demand for General Interest Courses	88	C/S3	12	70.59
Revisions to the Colleges Act	17	L1	11	64.71
Increased Statutory Rights for the Disadvantaged	19	L3	11	64.71
Professions and Occupations Legislation	24	L8	11	64.71
Cable TV	8	T8	11	64.71
High Mobility	86	C/S1	11	64.71

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Table 11[1] (continued)

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Continuing Dominance of the Progressive Conservatives	42	P10	11	64.71
Private Sector Funding Increase	67	E10	11	64.71
Technological Advances in Teaching Modes	12	T12	11	64.71
Native Groups as Pressure Groups	55	P23	11	64.71
Community Demands on the Colleges	93	C/S8	11	64.71
Increased Public Service as Employment Area	94	C/S9	11	64.71
Medical Technology	4	T4	11	64.71
Word Processing	14	T14	11	64.71
Changing Patterns of Remuneration	65	E8	10	58.82
Federal Insistence that Provinces Pay a Greater Share of Postsecondary Education	38	P6	10	58.82
Dissatisfaction with Confederation	39	P7	10	58.82
Financial Administration Act or Equivalent	22	L6	10	58.82
The Physical Location of the Colleges	85	EC6	10	58.82
Development of New Sources of Energy	2	T2	10	58.82
Changes in Human Rights Legislation	20	L4	10	58.82
Diversified Clientele	101	C/S10g	10	58.82
Democratization of Decision Making	92	C/S7	9	52.94
Heritage Trust Fund	71	E14	9	52.94
Strained College-University Relations	45	P13	9	52.94

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Table 11[1] (continued)

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Changes in Federal-Provincial Agreements re: Postsecondary Education	26	L10	9	52.94
Shift in Educational Priorities toward "People Needs"	96	C/S10b	9	52.94
Politicans as a Pressure Group	51	P19	9	52.94
Labour Unions as Pressure Groups	52	P20	9	52.94
Increased Leisure Time—Strains on Recreational Land	82	EC3	8	47.06
Increased Disposable Income	69	E12	8	47.06
The Council of Provincial Ministers of Education	41	P9	8	47.06
Television for Communication and Information Retrieval	9	T9	8	47.06
Changes in Apprenticeship Legislation	25	L9	8	47.06
Environmental Control	80	EC1	8	47.06
Increased Student Aid	23	L7	8	47.06
Change Causing Social and Psychological Casualties	102	C/S10h	8	47.06
Legislation Assuring Equal Access to Postsecondary Education for All Albertans	18	L2	7	41.18
Questioning Traditional Values	100	C/S10f	7	41.18
Constitutional Reform re: Treaty Indians	21	L5	7	41.18
Increased Utilization of Natural Renewable Resources	16	T16	7	41.18
New Canadians as a Pressure Group	56	P24	6	35.29
Legislation for Industry to Fund Release Time for Educational Opportunities for Workers	31	L15	6	35.29

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Table 11[1] (continued)

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Booming Construction Industry	70	E13	6	35.29
Desire of Third World Nations for a Higher Level of Postsecondary Education	34	P2	6	35.29
World Wide Economic Depression	72	E15	6	35.29
Growth in Awareness of Alberta's Interdependence with the Rest of the World	35	P3	5	29.41
Direction of Postsecondary Education in the U.S. and Ontario	36	P4	5	29.41
Creation of a Foundation for Research and Innovation in Education	29	L13	5	29.41
Legal Permissability of Private Educational Concerns	30	L14	5	29.41
Fibre Optics	11	T11	5	29.41
Legislation Regarding Community Use of Institutional Facilities	27	L11	5	29.41
Multiculturalism	91	C/S6	5	29.41
Increased Regulation by Federal and Provincial Governments of Economy	68	E11	5	29.41
Legislation Regarding Copyright for Printed and Visual Materials	28	L12	4	23.53
Increased Political Turbulence in the Third World	33	P1	4	23.53
Conference Telephone	10	T10	4	23.53
Advances in Learning Theory	15	T15	4	23.53
Militant Groups	57	P25	4	23.53

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Table 11[1] (continued)

Environmental Force	Code No.	Questionnaire Item	Number of Respondents	% of Total Group
Jurisdictional Disputes over Establishment of Standards for Professions and Trades	40	P8	3	17.65
Bilateral Trade Agreements between Alberta and Foreign Countries	66	E9	3	17.65
Reduction in Private Transport	83	EC4	2	11.76
Decrease in Land for Single Family Housing	84	EC5	2	11.76
Churches Regaining Social and Educational Functions	97	C/S10c	1	5.88
New Freedom in a Conservative Atmosphere	98	C/S10d	1	5.88
Legislation to Provide a Guaranteed Income	32	L16	1	5.88

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[1] Significance is determined by the percentage of respondents who rated Environmental Forces as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Significant Environmental Forces

Environmental Forces were "significant" if more than 80% of respondents rated a force either 1 or 2 for both Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact). A list of the 22 forces thus identified appears in Table 12. Therefore, any forces which received a divergent rating of 1 and 4 (Very Likely, No Impact or Very Unlikely, High Impact) or 1 and 3 (Very Likely, Low Impact or Not Likely, High Impact), or a low rating of 3 and 4 (Not Likely, No Impact or Very Unlikely, Low Impact) were eliminated from the consideration of significance.

These significant forces fell into four categories of decreasing importance. The force that was ranked first by 100% of respondents was that of Intensified Development of the Resource Industry. Four forces occurred in the second category, supported by 94% of respondents: Faculty as a Pressure Group; Buoyant Economy; Technological Demand for Training and Retraining; and Growing Alberta Population. Ten forces appeared in the third category, rated as significant by 88% of respondents: Government Policy of Fiscal Restraint; Inflation; Decentralization of College Services by Region; Industrial Expansion; Growth in Service Sector; Computer Technology; Industry as a Pressure Group; Increased In-migration; Regional Expansion of Population; and More Women in the Labour Force. The fourth category, rated significant by 82% of respondents, included seven forces: Civil Servants as a Pressure Group; Taxpayers as a Pressure Group; Government Priorities among all Sectors; Cost of

Table 12

Significant Environmental Forces,[1] Round II

Rank Order	Environmental Force	Questionnaire Item	Number of Respondents	Percentage of Total Group
1	Intensified Development of a Resource Industry	E6	17	100
2	Faculty as a Pressure Group	P15	16	94.12
	Buoyant Economy	E3	16	94.12
	Technological Demand for Training and Retraining	T1	16	94.12
	Growing Alberta Population	D1	16	94.12
3	Government Policy of Fiscal Restraint	E1	15	88.24
	Inflation	E2	15	88.24
	Decentralization of College Services by Region	P14	15	88.24
	Industrial Expansion	E4	15	88.24
	Growth in Service Sector	E5	15	88.24
	Computer Technology	T5	15	88.24
	Industry as a Pressure Group	P22	15	88.24
	Increasing In-migration	D2	15	88.24
	Regional Expansion of Population	D5	15	88.24
	More Women in the Labour Force	D6	15	88.24

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[1] Significant Environmental Forces are those forces which were rated either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact) by more than 80% of respondents.

Table 12[1] (continued)

Rank Order	Environmental Force	Questionnaire Item	Number of Respondents	Percentage of Total Group
4	Civil Servants as a Pressure Group	P17	14	82.35
	Taxpayers as a Pressure Group	P18	14	82.35
	Government Priorities among All Sectors	P11	14	82.35
	Cost of Education	E7	14	82.35
	Fragmentation of the Family Unit	C/S2	14	82.35
	Changing Role of Women	C/S5	14	82.35
	Different Student Population	C/S10(a)	14	82.35

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[1] Significant Environmental Forces are those forces which were rated either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact) by more than 80% of respondents.

Education; Fragmentation of the Family Unit; Changing Role of Women; and Different Student Population.

Highly Significant Environmental Forces

Environmental Forces were "highly significant" if more than 25% of respondents rated a force as 1 for both Likelihood and Impact (Very Likely, High Impact). Again a list of 22 forces was compiled (Table 13) although they were not entirely the same ones nor in the same ranked order.

In this round, there were seven categories of forces of decreasing importance. The highest ranking force, rated as highly significant by 82% of respondents, was the Technological Demand for Training and Retraining. In second place, at 76%, was the Growing Alberta Population. The third category, at 53%, contained three forces: Inflation; Industry as a Pressure Group; and Increasing In-migration. The fourth category, at 47%, also contained three forces: Decentralization of College Services by Region; Intensified Development of the Resource Industry; and Regional Expansion of Population. Five forces occurred in the fifth category, rated as highly significant by 41% of panelists: Industrial Expansion; Government Priorities within the Area of Education; Government Policy of Fiscal Restraint; Computer Technology; and Buoyant Economy. The sixth category, at 35%, contained two forces: Faculty as a Pressure Group; and Growth in the Service Sector, The final or seventh category, rated as highly significant by 29% of respondents, included seven forces: Word Processing; Government Priorities among All Sectors; The Market Rate for Qualified Instructors; Satellite Communications; Aging Population; Improved Data Storage and Retrieval; and Different Student Population.

Table 13

Highly Significant Environmental Forces,[1] Round II

Rank Order	Environmental Force	Questionnaire Item	Number of Respondents	Percentage of Total Group
1	Technological Demand for Training and Retraining	T1	14	82.35
2	Growing Alberta Population	D1	13	76.47
3	Inflation	E2	9	52.94
	Industry as a Pressure Group	P22	9	52.94
	Increasing In-migration	D2	9	52.94
4	Decentralization of College Services by Region	P14	8	47.06
	Intensified Development of Resource Industry	E6	8	47.06
	Regional Expansion of Population	D5	8	47.06
5	Industrial Expansion	E4	7	41.18
	Government Priorities within the Area of Education	P12	7	41.18
	Government Policy of Fiscal Restraint	E1	7	41.18
	Computer Technology	T5	7	41.18
	Buoyant Economy	E3	7	41.18

[1] Highly Significant Environmental Forces are those forces which were rated 1 for Likelihood of Occurrence in the Next Decade (1 = Very Likely) and 1 for Degree of Impact on Alberta's Community College System (1 = High Impact) by more than 25% of respondents.

Table 13[1] (continued)

Rank Order	Environmental Force	Questionnaire Item	Number of Respondents	Percentage of Total Group
6	Faculty as a Pressure Group	P15	6	35.29
	Growth in Service Sector	E5	6	35.29
7	Word Processing	T14	5	29.41
	Government Priorities among All Sectors	P11	5	29.41
	The Market Rate for Qualified Instructors	T6	5	29.41
	Satellite Communications	T7	5	29.41
	Aging Population	D3	5	29.41
	Improved Data Storage and Retrieval	T13	5	29.41
	Different Student Population	C/S10(a)	5	29.41

[1] Highly Significant Environmental Forces are those forces which were rated 1 for Likelihood of Occurrence in the Next Decade (1 = Very Likely) and 1 for Degree of Impact on Alberta's Community College System (1 = High Impact) by more than 25% of respondents.

Major Environmental Forces

Sixteen forces appeared on both the Significant and Highly Significant lists of environmental forces. These were entitled Major Environmental Forces and became the basis for the subsequent Round III questionnaire. A list of the Major Environmental Forces appears in Table 14 indicating the percentage of respondents who rated each force as Significant or Highly Significant.

These 16 forces were then rank-ordered by assigning each a weighting factor determined by taking the sum of one point per respondent who rated the force as Significant and one point per respondent who rated the force as Highly Singificant.

The resultant list of rank-ordered Major Environmental Forces (Table 15) was grouped into eight categories of decreasing importance. The highest ranking category contained the single force, Technological Demand for Training and Retraining. The second category again consisted of a single force, Growing Alberta Population, and the third, also singular, was Intensified Development of Resource Industry. The fourth group consisted of three forces: Inflation; Industry as a Pressure Group; and Increasing In-migration. The fifth category of importance also had three forces: Buoyant Economy; Decentralization of College Services by Region; and Regional Expansion of Population. There were four forces in the sixth category: Faculty as a Pressure Group; Government Policy of Fiscal Restraint; Industrial Expansion; and Computer Technology. The single force of Growth in the Service Sector was in the seventh category, while the two forces Government Priorities among all Sectors and Different Student Population comprised the eighth and final category.

Table 14

Major Environmental Forces,[1] Round II

Major Environmental Force	Number of Respondents Rating Force Significant	Percentage of Respondents Rating Force Significant	Number of Respondents Rating Force Highly Significant	Percentage of Respondents Rating Force Highly Significant
Intensified Development of Resource Industry	17	100	8	47.06
Faculty as a Pressure Group	16	94.12	6	35.29
Buoyant Economy	16	94.12	7	41.18
Technological Demand for Training and Retraining	16	94.12	14	82.35
Growing Alberta Population	16	94.12	13	76.47
Government Policy of Fiscal Restraint	15	88.24	7	41.18
Inflation	15	88.24	9	52.94
Decentralization of College Services by Region	15	88.24	8	47.06
Industrial Expansion	15	88.24	7	41.18
Growth in Service Sector	15	88.24	6	35.29

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[1] Major Environmental Forces are those forces which were rated as both Significant Environmental Forces by more than 80% of respondents (receiving either 1 or 2 for both Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System where 1 = Very Likely, High Impact and 2 = Likely, Moderate Impact) and Highly Significant Forces (receiving 1 for both Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System where 1 = Very Likely, High Impact) by more than 25% of respondents.

Table 14[1] (continued)

Major Environmental Force	Number of Respondents Rating Force Significant	Percentage of Respondents Rating Force Significant	Number of Respondents Rating Force Highly Significant	Percentage of Respondents Rating Force Highly Significant
Computer Technology	15	88.24	7	41.18
Industry as a Pressure Group	15	88.24	9	52.94
Increasing In-migration	15	88.24	9	52.94
Regional Expansion of Population	15	88.24	8	47.06
Government Priorities among All Sectors	14	82.35	5	29.41
Different Student Population	14	82.35	5	29.41

[1] Major Environmental Forces are those forces which were rated as both Significant Environmental Forces by more than 80% of respondents (receiving either 1 or 2 for both Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System where 1 = Very Likely, High Impact and 2 = Likely, Moderate Impact) and Highly Significant Forces (receiving 1 for both Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System where 1 = Very Likely, High Impact) by more than 25% of respondents.

Table 15

Rank-Ordered List of Major Environmental Forces, Round II

Rank Order	Weighting Factor[1]	Environmental Force
1	30	Technological Demand for Training and Retraining
2	29	Growing Alberta Population
3	25	Intensified Development of Resource Industry
4	24	Inflation
	24	Industry as a Pressure Group
	24	Increasing In-migration
5	23	Buoyant Economy
	23	Decentralization of College Services by Region
	23	Regional Expansion of Population
6	22	Faculty as a Pressure Group
	22	Government Policy of Fiscal Restraint
	22	Industrial Expansion
	22	Computer Technology
7	21	Growth in Service Sector
8	19	Government Priorities among All Sectors
	19	Different Student Population

[1] Weighting factor is derived by taking the sum of one point per respondent who rated the force as Significant and one point per respondent who rated the force as Highly Significant.

A comparison of the rank order of the three lists of forces, Significant Environmental Forces, Highly Significant Environmental Forces, and Major Environmental Forces appears in Table 16. Those forces which were eliminated from the final list of 16 Major Environmental Forces are highlighted with an asterisk. Specifically, those forces deleted from the list of Significant Environmental Forces were: More Women in the Labour Force at 88%; and Civil Servants as a Pressure Group; Taxpayers as a Pressure Group; Cost of Education; Fragmentation of the Family Unit; and Changing Role of Women, all at 82%. Although not considered major forces for the purposes of this study, their significance cannot be denied. Forces deleted from the Highly Significant list included: Government Priorities within the Area of Education at 41%; and Word Processing; The Market Rate for Qualified Instructors; Satellite Communications; Aging Population; and Improved Data Storage and Retrieval, all at 27%. Although again not considered major forces for the purposes of this study, it must be remembered that at least 25% of respondents considered these forces highly significant.

Frequency of Responses

The frequency of responses for the Major Environmental Forces was analyzed and is available in Table 17. It can be seen that all panelists (N = 17) rated every force with the exception of Government Priorities among All Sectors which was rated by 16 respondents. A generalization which can be made from examining the table is that the spread of responses for Impact was broader than the spread of responses for Likelihood in 50% of the cases. Also, it is obvious

Table 16

Comparison of Significant, Highly Significant, and Major Environmental Forces, Round II

Rank Order	Significant Environmental Forces	Highly Significant Environmental Forces	Major Environmental Forces
1	Intensified Development of Resource Industry	Technological Demand for Training and Retraining	Technological Demand for Training and Retraining
2	Growing Alberta Population	Growing Alberta Population	Growing Alberta Population
	Faculty as a Pressure Group		
	Buoyant Economy		
	Technological Demand for Training and Retraining		
3	Inflation	Inflation	Intensified Development of Resource Industry
	Industry as a Pressure Group	Industry as a Pressure Group	
	Increasing In-migration	Increasing In-migration	
	Decentralization of College Services by Region		
	Regional Expansion of Population		
	Government Policy of Fiscal Restraint		
	Industrial Expansion		
	Computer Technology		
	Growth in Service Sector		
	*More Women in the Labour Force		

*Forces deleted from final list of Major Environmental Forces.

Table 16 (continued)

Rank Order	Significant Environmental Forces	Highly Significant Environmental Forces	Major Environmental Forces
4	Government Priorities among All Sectors Different Student Population *Civil Servants as a Pressure Group *Taxpayers as a Pressure Group *Cost of Education *Fragmentation of the Family Unit *Changing Role of Women	Intensified Development of Resource Industry Decentralization of College Services by Region Regional Expansion of Population	Inflation Industry as a Pressure Group Increasing In-migration
5		Buoyant Economy Government Policy of Fiscal Restraint Industrial Expansion Computer Technology *Government Priorities within the Area of Education	Buoyant Economy Decentralization of College Services Regional Expansion of Population

*Forces deleted from final list of Major Environmental Forces.

Table 16 (continued)

Rank Order	Significant Environmental Forces	Highly Significant Environmental Forces	Major Environmental Forces
6		Faculty as a Pressure Group Growth in Service Sector	Faculty as a Pressure Group Government Policy of Fiscal Restraint Industrial Expansion Computer Technology
7		Government Priorities among All Sectors Different Student Population *Word Processing *The Market Rate for Qualified Instructors *Satellite Communication *Aging Population *Improved Data Storage and Retrieval	Growth in Service Sector
8			Government Priorities among All Sectors Different Student Population

*Forces deleted from final list of Major Environmental Forces.

Table 17

Frequency of Responses
Major Environmental Forces, Round II

Environmental Force	Rating Scale	Questionnaire Response[1]				Number of Respondents
		1	2	3	4	
Technological Demand for Training and Retraining	L[2]	16	1	-	-	17
	I[3]	15	1	1	-	17
Growing Alberta Population	L	15	2	-	-	17
	I	13	3	1	-	17
Intensified Development of Resource Industry	L	10	7	-	-	17
	I	9	8	-	-	17
Inflation	L	13	4	-	-	17
	I	10	5	2	-	17
Industry as a Pressure Group	L	10	7	-	-	17
	I	10	5	2	-	17
Increasing In-migration	L	14	2	1	-	17
	I	9	6	2	-	17
Buoyant Economy	L	10	6	1	-	17
	I	9	7	1	-	17
Decentralization of College Services by Region	L	13	3	1	-	17
	I	9	6	2	-	17
Regional Expansion of Population	L	10	7	-	-	17
	I	10	5	2	-	17
Faculty as a Pressure Group	L	10	7	-	-	17
	I	10	6	1	-	17
Government Policy of Fiscal Restraint	L	11	6	-	-	17
	I	9	6	2	-	17

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[1] Questionnaire Response: Possible responses for Likelihood of Occurrence in the Next Decade included 1 = Very Likely, 2 = Likely, 3 = Not Likely, and 4 = Very Unlikely.

Possible responses for Degree of Impact on Alberta's Community College System included 1 = High Impact, 2 = Moderate Impact, 3 = Low Impact, and 4 = No Impact.

[2] L = Likelihood of Occurrence in the Next Decade.

[3] I = Degree of Impact on Alberta's Community College System.

Table 17 (continued)

Environmental Force	Rating Scale	Questionnaire Response[1] 1	2	3	4	Number of Respondents
Industrial Expansion	L[2]	11	5	1	-	17
	I[3]	8	7	2	-	17
Computer Technology	L	11	5	1	-	17
	I	8	7	2	-	17
Growth in Service Sector	L	10	7	-	-	17
	I	6	9	1	1	17
Government Priorities among All Sectors	L	7	8	1	-	16
	I	5	10	1	-	16
Different Student Population	L	8	8	1	-	17
	I	6	8	3	-	17

[1] Questionnaire Response: Possible responses for Likelihood of Occurrence in the Next Decade included 1 = Very Likely, 2 = Likely, 3 = Not Likely, and 4 = Very Unlikely.

Possible responses for Degree of Impact on Alberta's Community College System included 1 = High Impact, 2 = Moderate Impact, 3 = Low Impact, and 4 = No Impact.

[2] L = Likelihood of Occurrence in the Next Decade.

[3] I = Degree of Impact on Alberta's Community College System.

that as the forces decrease in importance, the breadth of responses widened.

Hall's Typology

An analysis of Hall's Typology, which formed the basis of categorizing forces in the first two rounds of the study, is available in Table 18. The types of forces outlined by Hall are rank-ordered according to the sum of the weighting factors for each of the Major Environmental Forces. Economic Forces were judged by far the most important in the next decade, both in absolute terms, having the largest number of forces (six) identified in this area, and in relative terms, by receiving the highest weight of 137. Political Forces were considered of secondary importance, represented by the identification of four political forces, and the receipt of a weight of 88. Demographic Forces, deemed tertiary, followed close behind with the identification of three forces and a weight of 76. Technological Forces were rated as only moderately important, with two forces identified and a weight of 52. Cultural/Societal Forces were considered only slightly important with the identification of one force and a weight of 19. Legislative and Ecological Forces were believed to not be important at all in the next decade as no forces were identified as major in either area.

Impact of Major Environmental Forces

Having identified what the Major Environmental Forces would be for the next decade according to the perceptions of panelists, it seems appropriate now to view what impacts they projected that these

Table 18

Hall's Typology and Major Environmental Factors Identified in Round II with Weighting Factors[1]

Hall's Typology	Major Environmental Forces Identified, Round II	Weighting Factor	Total Weight
Economic Forces	Intensified Development of Resource Industry	25	
	Inflation	24	
	Buoyant Economy	23	
	Government Policy of Fiscal Restraint	22	
	Industrial Expansion	22	
	Growth in Service Sector	21	137
Political Forces	Industry as a Pressure Group	24	
	Decentralization of College Services by Region	23	
	Faculty as a Pressure Group	22	
	Government Priorities among All Sectors	19	88
Demographic Forces	Growing Alberta Population	29	
	Increasing In-migration	24	
	Regional Expansion of Population	23	76
Technological Forces	Technological Demand for Training and Retraining	30	
	Computer Technology	22	52
Cultural/ Societal Forces	Different Student Population	19	19
Legislative Forces	--	0	0
Ecological Forces	--	0	0

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[1] The Weighting Factor is derived by taking the sum of one point for each of the total number of respondents who indicated that the force was Significant and one point for each of the number of respondents who indicated that the force was Highly Significant.

forces would have on the community college system. As stated above, most of the Reasons for Importance given in Round 1 identified specific outcomes to be sustained by the colleges as they came in contact with certain Major Environmental Forces. An analysis of these outcomes follows, based on the Reasons for Importance given for specific environmental forces.

Force	Outcomes Suggested
1. Technological Training and Retraining	1. (a) Need to expand capability to train and maintain knowledge and skill levels of the labour force.
	(b) Need to keep current with changes in technology.
2. Growing Alberta Population	2. (a) More potential students but with higher expectations and greater demands for decentralized services.
	(b) Need to keep abreast of population changes.
3. Intensified Development of Resource Industry	3. (a) Increased pressure to meet skilled manpower requirements.
	(b) Both labour requirements and availability of funding will steer college development in this direction.
4. Inflation	4. (a) Need for effective and efficient allocation of funds.
	(b) Difficult decisions about reductions in service, staff, and programs.

5. Industry as a Pressure Group	5. (a) Modifications in apprenticeship and other training programs to reflect the demands of the labour market. (b) Greater communication between colleges and the private sector leading to possible assistance from industry such as capital, equipment, on-the-job training.
6. Increasing In-migration	6. (a) An itinerant mobile population, largely unskilled, will create pressures on scheduling and delivery modes.
7. Buoyant Economy	7. (a) A strong employment market will draw potential full-time students, increasing part-time enrolment substantially and making non-traditional scheduling demands.
8. Decentralization of College Services by Region	8. (a) Conflict between desire to provide a full spectrum of postsecondary education and the need to be responsive to regional demands.
9. Regional Expansion of Population	9. (a) Need for specialized training to meet regional demands. (b) Need for non-traditional delivery systems such as on-site training.
10. Faculty as a Pressure Group	10. (a) Lack of flexibility due to rigid contracts will increase costs without increasing productivity. (b) Increased power and influence through the provincial association and unionization

	will result in difficulties reducing redundant or incompetent staff.
11. Industrial Expansion	11. (a) Emphasis on short-term job-oriented training programs to the detriment of the humanities and the arts.
12. Government Policy of Fiscal Restraint	12. (a) Pressure to increase efficiency and productivity. (b) Infusions of money for politically-motivated activities will threaten college autonomy. (c) More time will be needed for fund raising, leading to different management responsibilities and fiscal policies.
13. Computer Technology	13. (a) Requirement for knowledge of computer applications in many program areas as well as the development of new programs. (b) Decline in conventional courses such as Bookkeeping.
14. Growth in Service Sector	14. (a) Need for new training programs.
15. Government Priorities among all Sectors	15. (a) Limited public support will force colleges to find new ways of meeting financial needs. (b) Greater accountability and dependence on government at the expense of college autonomy.
16. Different Student Population	No impacts recorded but refer to 2, 6, and 9.

A closer analysis of these Outcome Suggested revealed that the Major Impacts would be experienced by the colleges:

1. Demands for Flexibility
2. Demands for Accountability.

In order to cope with rapid environmental shifts, colleges will have to demonstrate unprecedented flexibility in a number of administrative areas, while at the same time responding to demands from both government and the public for accountability.

Ten Impact Areas were tentatively drawn from the Outcome Suggested and fell into the categories defined by the two Major Impacts. These were:

1. Demands for Flexibility
    a. Revision, Expansion and Creation of Programs
    b. Current Program Cuts
    c. New Scheduling Approaches
    d. Non-traditional Delivery Systems Development
    e. Loss in Flexibility of Staffing
2. Demands for Accountability
    a. Accountability and Loss of Autonomy
    b. New Ways of Funding
    c. Efficiency and Productivity Demands
    d. Need to Stay Current
    e. Interaction with the Private Sector.

A matrix of these Tentative Impact Areas, the Major Environmental Forces and Major Impacts is available in Table 19 while Table 20 outlines the number of citations of the Tentative Impact Areas for each of the Major Impacts. Demands for Flexibility received greater

Table 19

Major Environmental Forces, Major Impacts and Tentative Impact Areas, Round II

Major Impacts	Flexibility					Accountability				
Tentative Impact Area / Force	Revision, Expansion and Creation of Programs	Current Program Cuts	New Scheduling Approaches	Non-traditional Delivery Systems Development	Loss in Flexibility of Staffing	Accountability and Loss of Autonomy	New Ways of Funding	Efficiency and Productivity Demands	Need to Stay Current	Interaction with Private Sector
Technological Training and Retraining	X								X	
Growing Alberta Population			X	X					X	
Intensified Development of Resource Industry	X					X				
Inflation		X						X		
Industry as a Pressure Group	X						X			X
Increasing In-migration			X	X						
Buoyant Economy			X							
Decentralization of College Services by Region	X	X								
Regional Expansion of Population	X			X						
Faculty as a Pressure Group					X					
Industrial Expansion	X	X								
Government Policy of Fiscal Restraint						X	X	X		
Computer Technology	X	X								
Growth in Service Sector	X									
Government Priorities among All Sectors						X	X			
Different Student Population										

Table 20

Number or Citations of Tentative Impact Areas for Major Impacts

Major Impact	Tentative Impact Area	Number of Citations
Demands for Flexibility	Revision, Expansion, and Creation of Programs	8
	Current Program Cuts	4
	New Scheduling Approaches	3
	Non-traditional Delivery System Development	3
	Loss in Flexibility of Staffing	1
Total Number of Citations		19
Demands for Accountability	Accountability and Loss of Autonomy	3
	New Ways of Funding	3
	Efficiency and Productivity Demands	2
	Need to Stay Current	2
	Interaction with Private Sector	1
Total Number of Citations		11

emphasis as there was a total of 19 citations for related Tentative Impact Areas. Demands for Accountability was stressed to a lesser degree, receiving 11 citations. The most frequently cited Tentative Impact Area for the Major Impact of Demands for Flexibility was Revision, Expansion, and Creation of Programs, mentioned eight times, followed in descending order of frequency by Current Program Cuts, mentioned four times, New Scheduling Approaches and Non-traditional Delivery System Development, each mentioned three times, and finally Loss in Flexibility of Staffing, mentioned once. The most frequently cited Tentative Impact Areas for Demands for Accountability were Accountability and Loss of Autonomy and New Ways of Funding, each with three citations, followed by Efficiency and Productivity Demands and Need to Stay Current, each with two citations, and Interaction with the Private Sector with one citation.

A Different Student Population received no suggestions for Tentative Impact Areas but it is assumed that selected areas related to the forces Growing Alberta Population, Increasing In-migration, and Regional Expansion of Population would apply: specifically, New Scheduling Approaches; and Non-traditional Delivery Systems Development.

Summary of Findings

The purpose of Round II was to rate the Environmental Forces identified in Round I for Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System in order to determine what the major environmental forces would be. From two separate lists of Significant and Highly Significant forces, a third list of 16 Major Environmental Forces was determined by including all forces which appeared on both of the first two lists. These 16 forces were then rank ordered by a weighting scheme into a final list of eight categories of decreasing importance. In order of importance, the Major Environmental Forces identified in Round II were:

1. Technological Demand for Training and Retraining
2. Growing Alberta Population
3. Intensified Development of the Resource Industry
4. Inflation
   Industry as a Pressure Group
   Increasing In-migration
5. Buoyant Economy
   Decentralization of College Services by Region
   Regional Expansion of Population
6. Faculty as a Pressure Group
   Government Policy of Fiscal Restraint
   Industrial Expansion
   Computer Technology
7. Growth in Service Sector
8. Government Priorities among All Sectors
   Different Student Population.

With regard to Hall's Typology, which provided the theoretical basis for the study, it was determined that panelists considered Economic Forces to be by far the most significant, followed by Political and Demographic Forces. Technological Forces were judged of lesser significance and Cultural/Societal Forces gained only slight attention. Legislative and Ecological Forces were perceived as having no major influence on the development of colleges in the next decade at all.

From an analysis of the Reasons for Importance proposed by respondents for specific Major Environmental Forces, two Major Impacts emerged as likely to be experienced by the colleges in response to environmental pressures. These Major Impacts were:

1. Demands for Flexibility
2. Demands for Accountability.

Tentative Impact Areas were identified for each of these Major Impacts. These were:

1. Demands for Flexibility
    a. Revision, Expansion and Creation of Programs
    b. Current Program Cuts
    c. New Scheduling Approaches
    d. Non-traditional Delivery System Development
    e. Loss in Flexibility of Staffing
2. Demands for Accountability
    a. Accountability and Loss of Autonomy
    b. New Ways of Funding
    c. Efficiency and Productivity Demands
    d. Need to Stay Current
    e. Interaction with the Private Sector.

Scenario

As a form of summary, the views of Alberta community college presidents and Alberta Advanced Education and Manpower officials directly responsible for the community college system can be stated in the scenario which follows.

The major challenge of the decade for Alberta's community colleges will be to meet the demands emanating from the resource extraction industry, and industry in general, to train technicians and retrain obsolete ones to keep pace with rapid advances in technology. As a result, colleges will find themselves frequently developing new programs and updating current ones, while some programs will be phased out altogether. In addition to technological programming, their offerings will be expanded to meet the needs of the growing service sector. Computer applications will become a basic component of many programs. In general, colleges will have to keep pace with new advances in knowledge and skill areas and should improve communications with the private sector.

Colleges will have to demonstrate flexibility in serving the mature, part-time student population through new approaches to scheduling and the development of non-traditional delivery systems.

Two major roadblocks are expected to hinder the colleges' expansionary plans. One is increased faculty unionization which will limit staffing flexibility. The other is a continued government policy of fiscal restraint in the area of education. Demands for efficiency and productivity will continue while a loss of autonomy will be experienced by the colleges. As a result they will turn to alternative funding sources in an attempt to fulfil their perceived mandates.

ROUND III

Overview

The purpose of Round III was to have respondents analyze the potential influence of the Major Environmental Forces on a specific policy area, namely the demand for technological training and retraining, identified in Round II as being the most important force projected as likely to have an impact on community colleges in the next decade. It was hoped that Round III would highlight the interactive nature of environmental forces and broaden considerations in a policy analysis context. Respondents were asked to rate the influence on a four-point scale of each of the other 15 Major Environmental Forces on the policy decision area generated by the most important force, Technological Training and Retraining. In addition, respondents were asked to suggest ways in which colleges could adjust to each environmental force when considering future policy decisions in the area of technological training and retraining. Additional space for comments was provided.

Description of Data

The data received in Round III were analyzed both to determine the relative influence of specific forces on policy development in the area of technological training and retraining and to determine possible college adjustments as a result of these influences. A total of 351 adjustments was suggested. Consult Table 21 for a list of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, number of respondents rating influence, number of Possible College Adjustments, and number of respondents suggesting adjustments.

Analysis of Data

While all panelists (N = 17) rated most of the influences, a drop-off was observed in the last two questions with only 16 responses for item 14 and 15 responses for item 15 (see Table 21). The respondent who omitted question 14 inserted a question mark at this point. The monitor was unable to determine if the drop-off for question 15 was due to questionnaire fatigue or to other unknown forces.

The instructions and purpose of the questionnaire appeared otherwise to be clear as only one general comment identified difficulty in making a conceptual distinction among the Major

Table 21

Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, Round III, with Number of Respondents Rating Influence, Number of Possible College Adjustments with Number of Respondents, and Number of Referral Responses
(N = 17)

Influential Force on Technological Training and Retraining	Number of Respondents Rating Influence	Number of Possible College Adjustments	Number of Respondents Suggesting Adjustments	Number of Referral Responses
1. Growing Alberta Population	17	34	16	-
2. Intensified Development of Resource Industry	17	35	15	2
3. Inflation	17	28	14	-
4. Industry as a Pressure Group	17	18	12	1
5. Increasing In-migration	17	26	13	4
6. Buoyant Economy	17	19	12	2
7. Decentralization of College Services by Region	17	22	13	-
8. Regional Expansion of Population	17	22	11	5
9. Faculty as a Pressure Group	17	22	13	-
10. Government Policy of Fiscal Restraint	17	20	14	1
11. Industrial Expansion	17	17	13	1
12. Computer Technology	17	24	14	-
13. Growth in Service Sector	17	18	13	1
14. Government Priorities among All Sectors	16	16	10	2
15. Different Student Population	15	30	13	3

Environmental Forces (see below). No marginal comments were recorded.

The response rate was not as high for the identification of Possible College Adjustments. It varied from a high of 16 responses for item 1 to a low of 10 for item 14. (Interestingly, item 14, Government Priorities among all Sectors, had been the only item of significant disagreement in Round II.) Twenty-two responses were simply referrals to other suggestions which demonstrates that a degree of overlap amongst the forces was experienced by panelists.

Rating of Influential Forces

A method similar to that employed in Round II was used to arrive at a list of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade rank-ordered by weight. Briefly, the method involved:

1. Development of a rank-ordered list of Influential Forces by percentage ratings of 1 (High Influence) and 2 (Moderate Influence). (Consult Table 22.)

2. Development of a rank-ordered list of Influential Forces by percentage ratings of 1 (High Influence). (Consult Table 23.)

3. Development of a rank-ordered list of Influential forces with weighting factors. (The weighting factors were derived by taking the sum of one point per respondent rating as in #1 above and one point per respondent rating as in #2.) (Consult Table 24.)

This third weighted list of Influential Forces provided the basis for further analysis. It is important to note that no percentage cut-off point was employed for this round, as the forces only numbered 15. However, had the criterion of 80% for #1 above and 25% for #2

Table 22

Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, Round III, Ranked by Percentage Ratings of 1 (High Influence) or 2 (Moderate Influence)[1]

Rank Order	Environmental Force Influencing Technological Training and Retraining	Questionnaire Item	Number of Respondents	Percentage of Total Group
1	Growing Alberta Population	1	17	100
	Intensified Development of Resource Industry	2	17	100
2	Industrial Expansion	11	16	94.12
	Computer Technology	12	16	94.12
3	Industry as a Pressure Group	4	15	88.24
	Increasing In-migration	5	15	88.24
	Decentralization of College Services by Region	7	15	88.24
	Government Policy of Fiscal Restraint	10	15	88.24
4	Regional Expansion of Population	8	13	76.47
5	Different Student Population	15	12	70.59
6	Inflation	3	11	64.71
	Growth in Service Sector	13	11	64.71
7	Government Priorities among All Sectors	14	10	58.82

[1] The rank order of Influential Forces was determined by the percentage of respondents who rated Influences of a Particular Force on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade as either 1 (High Influence) or 2 (Moderate Influence).

Table 22[1] (continued)

Rank Order	Environmental Force Influencing Technological Training and Retraining	Questionnaire Item	Number of Respondents	Percentage of Total Group
8	Faculty as a Pressure Group	9	9	52.94
9	Buoyant Economy	6	8	47.06

[1] The rank order of Influential Forces was determined by the percentage of respondents who rated Influences of a Particular Force on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade as either 1 (High Influence) or 2 (Moderate Influence).

Table 23

Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, Round III, Ranked by Percentage Ratings of 1 (High Influence)[1]

Rank Order	Environmental Force Influencing Technological Training and Retraining	Questionnaire Item	Number of Respondents	Percentage of Total Group
1	Intensified Development of Resource Industry	2	13	76.47
2	Growing Alberta Population	1	10	58.82
	Industrial Expansion	11	10	58.82
3	Government Policy of Fiscal Restraint	10	9	52.94
4	Decentralization of College Services by Region	7	8	47.05
	Computer Technology	12	8	47.05
5	Regional Expansion of Population	8	5	29.41
	Government Priorities among All Sectors	14	5	29.41
6	Industry as a Pressure Group	4	4	23.53
	Increasing In-migration	5	4	23.53
	Faculty as a Pressure Group	9	4	23.53
7	Inflation	3	3	17.65
	Growth in Service Sector	13	3	17.65

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[1] The rank order of Influential Forces was determined by the percentage of respondents who rated Influence of a Particular Force on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade as 1 (High Influence).

Table 23[1] (continued)

Rank Order	Environmental Force Influencing Technological Training and Retraining	Questionnaire Item	Number of Respondents	Percentage of Total Group
8	Buoyant Economy	6	2	11.76
9	Different Student Population	15	1	5.88

[1] The rank order of Influential Forces was determined by the percentage of respondents who rated Influence of a Particular Force on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade as 1 (High Influence).

Table 24

Rank-Ordered List of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade with Weighting Factors

Rank Order	Weighting Factor[1]	Influential Force
1	30	Intensified Development of Resource Industry
2	27	Growing Alberta Population
3	26	Industrial Expansion
4	24	Computer Technology
	24	Government Policy of Fiscal Restraint
5	23	Decentralization of College Services by Region
6	19	Industry as a Pressure Group
	19	Increasing In-migration
7	18	Regional Expansion of Population
8	15	Government Priorities among All Sectors
9	14	Inflation
	14	Growth in Service Sector
10	13	Faculty as a Pressure Group
	13	Different Student Population
11	10	Buoyant Economy

[1] Weighting factor is derived by taking the sum of one point per respondent who rated the force as 1 or 2 (1 = High Influence, 2 = Moderate Influence) and one point per respondent who rated the force as 1 (1 = High Influence).

been used, the top six Influential Forces would have remained the same. Table 25 provides a comparison of ratings with percentages for #1 and #2 above, while Table 26 illustrates in detail the placement of Influential Forces in each of the three abovementioned lists.

The final weighted list of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade grouped the 15 forces into 11 ranks of descending order. The first five categories contained the following Influential Forces: (1) Intensified Development of Resource Industry; (2) Growing Alberta Population; (3) Industrial Expansion; (4) Computer Technology; and Government Policy of Fiscal Restraint; and (5) Decentralization of College Services by Region. Each of these Major Environmental Forces could be considered as being highly influential on future policy decisions related to Technological Training and Retraining. The last six categories contained both pairs and individual forces: (6) Industry as a Pressure Group; and Increasing In-migration; (7) Regional Expansion of Population; (8) Government Priorities among All Sectors; (9) Inflation; and Growth in the Service Sector; (10) Faculty as a Pressure Group; and Different Student Population; and (11) Buoyant Economy. Each of these Major Environmental Forces could be considered as being moderately influential on future policy decisions related to Technological Training and Retraining.

A comparison of the ranking of Major Environmental Forces (Round II) with Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade (Round III) provides some interesting shifts in perceived importance. Consult

Table 25

Comparison of Influential Forces on Future Policy Decisions Regarding Technological Training and Retraining in the Next Decade, Round III, Ranked by Percentage Ratings of 1 or 2 (1 = High Influence, 2 = Moderate Influence) and 1 (1 = High Influence)

Influential Forces	Number of Respondents Rating Force 1 or 2	Percentage of Respondents Rating Force 1 or 2	Number of Respondents Rating Force 1	Percentage of Respondents Rating Force 1
Growing Alberta Population	17	100	10	58.82
Intensified Development of Resource Industry	17	100	13	76.47
Industrial Expansion	16	94.12	10	58.82
Computer Technology	16	94.12	8	47.05
Industry as a Pressure Group	15	88.24	4	23.53
Increasing In-migration	15	88.24	4	23.53
Decentralization of College Services by Region	15	88.24	8	47.05
Government Policy of Fiscal Restraint	15	88.24	9	52.94
Regional Expansion of Population	13	76.47	5	29.41
Different Student Population	12	70.59	1	5.88
Inflation	11	64.71	3	17.65
Growth in Service Sector	11	64.71	3	17.65
Government Priorities among All Sectors	10	58.82	5	29.41
Faculty as a Pressure Group	9	52.94	4	23.53
Buoyant Economy	8	47.06	2	11.76

Table 26

Comparison of Influential Forces Related to Policy Decisions Regarding Technological Training and Retraining in the Next Decade Rated 1 or 2, Rated 1, and Ranked by Weight, Round III

Rank Order	Influential Forces Rated 1 or 2	Influential Forces Rated 1	Influential Forces by Weight
1	Intensified Development of Resource Industry Growing Alberta Population	Intensified Development of Resource Industry	Intensified Development of Resource Industry
2	Industrial Expansion Computer Technology	Growing Alberta Population Industrial Expansion	Growing Alberta Population
3	Government Policy of Fiscal Restraint Decentralization of College Services by Region Industry as a Pressure Group Increasing In-migration	Government Policy of Fiscal Restraint	Industrial Expansion
4	Regional Expansion of Population	Computer Technology Decentralization of College Services by Region	Computer Technology Government Policy of Fiscal Restraint
5	Different Student Population	Regional Expansion of Population Government Priorities among All Sectors	Decentralization of College Services by Region

Table 26 (continued)

Rank Order	Influential Forces Rated 1 or 2	Influential Forces Rated 1	Influential Forces by Weight
6	Inflation Growth in Services Sector	Industry as a Pressure Group Increasing In-migration Faculty as a Pressure Group	Industry as a Pressure Group Increasing In-migration
7	Government Priorities among All Sectors	Inflation Growth in Service Sector	Regional Expansion of Population
8	Faculty as a Pressure Group	Buoyant Economy	Government Priorities among All Sectors
9	Buoyant Economy	Different Student Population	Inflation Growth in Service Sector
10			Faculty as a Pressure Group Different Student Population
11			Buoyant Economy

Table 27 for a detailed comparison of forces and Table 28 for a summarized version. With the removal of Technological Training and Retraining from the list of forces, the Growing Alberta Population was in next order of importance, followed by Intensified Development of the Resource Industry. But when these two forces were considered in relation to Technological Training and Retraining, their order reversed, and Intensified Development of the Resource Industry was rated as the most influential force on policy decisions, followed by the Growing Alberta Population. The third most-influential force, Industrial Expansion, was raised from sixth position, as were the fourth most influential forces, Computer Technology and Government Policy of Fiscal Restraint, also previously in sixth position. The fifth most influential force on policy decisions regarding Technological Training and Retraining was Decentralization of College Services by Region, unmoved from Round II. The remaining nine forces were considered of lesser or equal importance in relation to Technological Training and Retraining than they were when considered in terms of the general environment: Inflation moved from third to ninth position; Industry as a Pressure Group and Increasing In-migration both moved from fourth position to sixth; Buoyant Economy moved from fifth to eleventh position; Regional Expansion of Population from fifth to seventh; Faculty as a Pressure Group from sixth to tenth; Growth in the Service Sector from seventh to ninth; Government Priorities among All Sectors remained at eighth position; and Different Student Population from eighth to tenth.

Therefore, to conclude, the first six Influential Forces

Table 27

Comparison of Rank-Ordered Major Environmental Forces, Round II with Rank-Ordered Influential Forces on Technological Training and Retraining

Rank Order	Major Environmental Forces Round II	Influential Forces Round III
1	Technological Demand for Training and Retraining	Intensified Development of Resource Industry
2	Growing Alberta Population	Growing Alberta Population
3	Intensified Development of Resource Industry	Industrial Expansion
4	Inflation Industry as a Pressure Group Increasing In-migration	Computer Technology Government Policy of Fiscal Restraint
5	Buoyant Economy Decentralization of College Services by Region Regional Expansion of Population	Decentralization of College Services by Region
6	Faculty as a Pressure Group Government Policy of Fiscal Restraint Industrial Expansion Computer Technology	Industry as a Pressure Group Increasing In-migration
7	Growth in Service Sector	Regional Expansion of Population
8	Government Priorities among All Sectors	Government Priorities among All Sectors
9		Inflation Growth in Service Sector
10		Faculty as a Pressure Group Different Student Population
11		Buoyant Economy

Table 28

Summary Comparison of Forces
Round II and III

Force	Rank Order Round II	Rank Order Round III
Technological Training and Retraining	1	-
Growing Alberta Population	2	2
Intensified Development of Resource Industry	3	1
Inflation	4	9
Industry as a Pressure Group	4	6
Increasing In-migration	4	6
Buoyant Economy	5	11
Decentralization of College Services by Region	5	5
Regional Expansion of Population	5	7
Faculty as a Pressure Group	6	10
Government Policy of Fiscal Restraint	6	4
Industrial Expansion	6	3
Computer Technology	6	4
Growth in Service Sector	7	9
Government Priorities among All Sectors	8	8
Different Student Population	8	10

identified in Round III, when considered in relation to policy development in the area of Technological Training and Retraining, were considered of equal or greater importance than they were when seen in relation to the general environment, while the last nine Influential Forces identified in Round III were generally considered of lesser importance when considered in relation to Technological Training and Retraining than when seen in relation to the general environment.

Frequency of Responses

The frequency of responses for the Influential Forces Related to Policy Decisions Regarding Technological Training and Retraining in the Next Decade was analyzed and is available in Table 29. It can be seen that after the fifth category, Decentralization of College Services by Region, the number of responses rating influence as high drops off sharply. In addition forces in the ninth and tenth categories (Inflation, Growth in Service Sector, Faculty as a Pressure Group, and Different Student Population) had the widest spread of responses, with one panelist considering each of the forces as irrelevant to the issue at hand.

Hall's Typology

An analysis of Hall's Typology in relation to the rating of the Influential Forces in Round III is available in Table 30. In addition, a comparison of the weighting of force types according to Hall's Typology is provided in Table 31. The relative importance of force types did not change between Rounds II and III, with Economic

Table 29

Frequency of Responses of the Influential Forces Related to Policy Decisions Regarding Technological Training and Retraining in the Next Decade, Round III

Rank Order		Questionnaire Response[1] (N = 17) 1	2	3	4	Number of Respondents
1	Intensified Development of Resource Industry	13	4	-	-	17
2	Growing Alberta Population	10	7	-	-	17
3	Industrial Expansion	10	6	1	-	17
4	Computer Technology	8	8	1	-	17
	Government Policy of Fiscal Restraint	9	6	2	-	17
5	Decentralization of College Services by Region	8	7	2	-	17
6	Industry as a Pressure Group	4	11	2	-	17
	Increasing In-migration	4	11	2	-	17
7	Regional Expansion of Population	5	8	4	-	17
8	Government Priorities among All Sectors	5	4	2	-	16
9	Inflation	3	8	5	1	17
	Growth in Service Sector	3	8	5	1	17
10	Faculty as a Pressure Group	4	5	7	1	17
	Different Student Population	1	11	2	1	15
11	Buoyant Economy	2	6	9	-	17

[1] 1 = High Influence
2 = Moderate Influence
3 = Low Influence
4 = No Influence

Table 30

Hall's Typology and Influential Forces on Technological Training and Retraining Identified in Round III with Weighting Factors[1]

Hall's Typology	Influential Forces Round III	Weighting Factor	Total Weight
Economic Forces	Intensified Development of Resource Industry	30	
	Industrial Expansion	26	
	Government Policy of Fiscal Restraint	24	
	Inflation	14	
	Growth in Service Sector	14	
	Buoyant Economy	10	118
Political Forces	Decentralization of College Services by Region	23	
	Industry as a Pressure Group	19	
	Government Priorities among All Sectors	15	
	Faculty as a Pressure Group	13	70
Demographic Forces	Growing Alberta Population	27	
	Increasing In-migration	19	
	Regional Expansion of Population	18	64
Technological Forces	Computer Technology	24	24
Cultural/ Societal Forces	Different Student Population	13	13
Legislative Forces	--	0	0
Ecological Forces	--	0	0

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[1] The Weighting Factor is derived by taking the sum of one point for each of the total number of respondents who rated the force 1 or 2 (1 = High Influence, 2 = Moderate Influence) and one point for each of the number of respondents who rated the force 1 (1 = High Influence).

Table 31

Comparison of Hall's Typology, Rounds II and III

Hall's Typology	Forces	Weight Round II	Weight Round III
Economic Forces	Intensified Development of Resource Industry	25	30
	Inflation	24	14
	Buoyant Economy	23	10
	Government Policy of Fiscal Restraint	22	24
	Industrial Expansion	22	26
	Growth in Service Sector	21	14
	Total Weight	137	118
Political Forces	Industry as a Pressure Group	24	19
	Decentralization of College Services by Region	23	23
	Faculty as a Pressure Group	22	13
	Government Priorities among All Sectors	19	15
	Total Weight	88	70
Demographic Forces	Growing Alberta Population	29	27
	Increasing In-migration	24	19
	Regional Expansion of Population	23	18
	Total Weight	76	64
Technological Forces	Technological Training and Retraining	30	--
	Computer Technology	22	24
	Total Weight	52	24
Cultural/ Societal Forces	Different Student Population	19	13
Legislative Forces	--	0	0
Ecological Forces	--	0	0

Forces being rated as most important in both rounds, followed in descending order by Political Forces, Demographic Forces, Technological Forces, and Cultural/Societal Forces. Legislative and Ecological Forces did not appear in either round. Economic Forces in Round III received the weight of 118, followed by Political Forces at 70, and Demographic Forces at 64. Technological Forces were rated much lower in Round III at 24 due to the fact that only one force remained in this category (Computer Technology) and in absolute terms ranked fourth. Cultural/Societal Forces lost ground with a weight of 13. When the weights of the force types are compared, it can be seen that in every case, the force types received less overall weight in Round II than in Round II, although four individual forces received an increased weight (Intensified Development of Resource Industry, Government Policy of Fiscal Restrain, Industrial Expansion, and Computer Technology) and one remained the same (Decentralization of College Services by Region).

To summarize the perceived influence of the environmental forces reviewed above, it can be concluded that six forces emerge as Major Influential Forces (Table 32) in that they retained or improved their rank order from Round II.

Impact Areas

Round III probed in greater depth the impacts to be experienced by colleges due to the pressure of environmental change through the examination of one policy decision area. As a result of this sharper focus, the ten Tentative Impact Areas of the Major Environmental Forces identified in Round II were revised slightly to produce the final twelve Impact Areas identified by the study. The Major Impacts of Demands for Flexibility and Demands for Accountability as identified in Round II remained unchanged.

Table 32

Major Influential Forces on Technological Training and Retraining, Round III

Rank Order	Major Influential Force on Technological Training and Retraining
1	Intensified Development of Resource Industry
2	Growing Alberta Population
3	Industrial Expansion
4	Computer Technology
	Government Policy of Fiscal Restraint
5	Decentralization of College Services by Region

In Round II the 10 Tentative Impact Areas of the Major Environmental Forces were identified as follows:

1. Revision, Expansion and Creation of Programs
2. Current Program Cuts
3. Accountability and Loss of Autonomy
4. New Ways of Funding
5. New Scheduling Approaches
6. Non-traditional Delivery Systems Development
7. Efficiency and Productivity Demands
8. Need to Stay Current
9. Loss in Flexibility of Staffing
10. Interaction with the Private Sector.

In Round III the 12 Impact Areas identified when considering the 15 major forces in relation to a single policy area were:

1. Programming
2. Facilities and Services
3. Liaison with Government
4. Liaison with Public
5. Funding
6. Scheduling and Admissions
7. Delivery Systems
8. Effectiveness/Efficiency
9. Planning
10. Faculty Affairs
11. Liaison with Industry
12. Liaison with Other Institutions.

Table 33 provides a comparison of Tentative Impact Areas in Round II and Impact Areas in Round III. The two lists are essentially similar, with the Impact Areas in Round III providing a more detailed analysis of the same areas. While Revision, Expansion, and Creation of Programs and Current Program Cuts were telescoped into one category, Programming, one other area expanded into two Impact Areas: Acccountability and Loss of Autonomy became Liaison with Government and Liaison with the Public. Seven areas remained basically unchanged: New Scheduling Approaches became Scheduling and Admissions; Nontraditional Delivery Systems Development became Delivery Systems; Loss in Flexibility of Staffing became Faculty Affairs; New Ways of Funding became Funding; Efficiency and Productivity Demands became Effectiveness/Efficiency; Need to Stay Current became Planning; and Interaction with the Private Sector became Liaison with Industry. Two new areas emerged: Liaison with Other Institutions, and Facilities and Services.

Possible College Adjustments

In Round II, two Outcomes Suggested related to Technological Training and Retraining. These were:

1. Revision, Expansion and Creation of Programs

   Need to expand capability to train and maintain knowledge and skill levels of the labour force.

2. Need to Stay Current

   Need to keep current with changes in technology.

In Round III, these two suggestions mushroomed into a total of 79 unique suggestions for Possible College Adjustments, based on

Table 33

Comparison of Tentative Impact Areas, Round II with Impact Areas, Round III

Major Impact	Tentative Impact Area Round II	Impact Area Round III
Demands for Flexibility	Revision, Expansion, and Creation of Programs	Programming
	Current Program Cuts	
	New Scheduling Approaches	Scheduling and Admissions
	Non-traditional Delivery Systems Development	Delivery Systems
	Loss in Flexibility of Staffing	Faculty Affairs
	--	Liaison with Other Institutions
	--	Facilities and Services
Demands for Accountability	Accountability and Loss of Autonomy	Liaison with Government Liaison with Public
	New Ways of Funding	Funding
	Efficiency and Productivity Demands	Effectiveness/ Efficiency
	Need to Stay Current	Planning
	Interaction with Private Sector	Liaison with Industry

the raw data of 351 responses. As can be seen in Table 34, Demands for Flexibility remained the more influential Major Impact with 204 responses and 43 unique suggestions for Possible College Adjustments while Demands for Accountability drew 147 responses and 36 unique suggestions.

The most frequently cited Impact Area resulting from Demands for Flexibility was Programming with 95 responses, followed by Delivery Systems with 44, Faculty Affairs and Facilities and Services each with 22, Scheduling and Admissions with 15, and Liaison with Other Institutions with 6 responses. The most frequently cited Impact Area resulting from Demands for Accountability was Planning with 38 responses, followed by Funding with 34, Liaison with Industry with 28, Liaison with Government with 24, Effectiveness/Efficiency with 17, and Liaison with the Public with 6 responses.

A rank-ordered list of Impact Areas by percentage of total responses is available in Table 35. A matrix of the total number of responses related to Impact Areas correlated with specific Major Environmental Forces interacting with Technological Training and Retraining can be found in Table 36.

A summary of the major suggested Possible College Adjustments by Impact Area for each of the Major Impacts follows. The complete list is available in Appendix 5.

1. Major Impact: Demands for Flexibility

Impact Area	Possible College Adjustments
a. Programming	(i) Assess requirements in industry and develop innovative courses and programs to provide training and retraining in marketable skills.

Table 34

Major Impacts and Impact Areas by Number of Responses and Number of Unique Suggestions per Impact Area

Major Impact	Impact Area	Number of Responses	Number of Unique Suggestions
Demands for Flexibility	Programming	95	15
	Delivery Systems	44	7
	Faculty Affairs	22	4
	Facilities and Services	22	6
	Scheduling and Admissions	15	6
	Liaison with Other Institutions	6	5
	Total	204	43
Demands for Accountability	Planning	38	6
	Funding	34	9
	Liaison with Industry	28	6
	Liaison with Government	24	7
	Efficiency/Effectiveness	17	4
	Liaison with the Public	6	4
	Total	147	36
Total Responses and Unique Suggestions		351	79

Table 35

Rank-Ordered Impact Areas by Percentage of Total Responses

Rank Order	Adjustment Area	Number of Responses	Percentage of Total Responses
1	Programming	95	27.0
2	Delivery Systems	44	12.5
3	Planning	38	10.8
4	Funding	34	9.7
5	Liaison with Industry	28	8.0
6	Liaison with Government	24	6.8
7	Faculty Affairs	22	6.2
	Facilities and Services	22	6.2
8	Effectiveness/Efficiency	17	4.8
9	Scheduling and Admissions	15	4.3
10	Liaison with Other Institutions	6	1.7
	Liaison with Public	6	1.7
	Total	351	99.7

Table 36

Major Environmental Forces, Major Impacts, and Impact Areas, Round III

Major Impact	Flexibility						Accountability						
Impact Areas / Major Environmental Force	Programming	Delivery Systems	Faculty Affairs	Facilities and Services	Scheduling and Admissions	Liaison with Other Institutions	Planning	Funding	Liaison with Industry	Liaison with Government	Effectiveness/Efficiency	Liaison with Public	Total Number of Responses
1. Growing Alberta Population	14	1		6	5		4	2	2				34
2. Intensified Development of Resource Industry	11	3	2	1	1		2	3	7	5			35
3. Inflation	2	5	3		1			9	2		6		28
4. Industry as a Pressure Group	2	1	1				1	2	11				18
5. Increasing In-migration	10	2		2	5		3	1		3			26
6. Buoyant Economy	6		1	3	1		5	3					19
7. Decentralization of College Services by Region	7	6	1	1		3	1	1		1	1		22
8. Regional Expansion of Population	4	8	1	2			3			3	1		22
9. Faculty as a Pressure Group	2		5			1	1	9		1	2	1	22
10. Government Policy of Fiscal Restraint	3	2			1		2	2	1	3	5	1	20
11. Industrial Expansion	8	2				1	4	1	1				17
12. Computer Technology	8	5	5			1	3	1			1		24
13. Growth in Service Sector	7			1			2		4	2		2	18
14. Government Priorities among All Sectors	3	2			1		2			5	1	2	16
15. Different Student Population	8	7	3	6			5			1			30
Total per Response Area	95	44	22	22	15	6	38	34	28	24	17	6	351

a. Programming (cont'd)	(ii)	Develop the capability to provide more extensive, short-term upgrading and retraining courses and programs.
	(iii)	Phase out programs and services in low demand.
	(iv)	Reexamine mission statement in the light of training needs and restrict area of specialty.
	(v)	Review demand for information processing personnel and develop appropriate computer-related programs.
	(vi)	Maintain a healthy balance between liberal and fine arts and career and trades programs.
	(vii)	Develop service courses to increase computer literacy in all students.
	(viii)	Offer courses rather than programs.
b. Delivery Systems	(i)	Participate in consortia delivery systems.
	(ii)	Devise cost-effective, less labour-intensive delivery systems and maintain cost-benefit analysis of them.
	(iii)	Develop innovative means for program delivery off campus.
	(iv)	Adapt program delivery to part-time study.
	(v)	Assess and utilize computer technology in the instructional process both on and off campus.
c. Faculty Affairs	(i)	Ensure faculty relevance through retraining.
	(ii)	Secure staff with specialized skills.
	(iii)	Ensure integration of liberal arts and trades instructors.
	(iv)	Ensure mutual understanding by sharing all available information.
d. Facilities and Services	(i)	Expand facilities regionally; decentralize services.
	(ii)	Expand and develop counselling and student service operations and learning centers.

e. Scheduling and Admissions	(i) Consider an extended day and year to accommodate increased numbers and maximize capital investment.
	(ii) Adjust to increased attendance by part-timers and to the need for short courses.
	(iii) Establish quotas where necessary, possibly based on residency.
	(iv) Develop additional program intakes.
	(v) Economize with larger classes.
f. Liaison with Other Institutions	(i) Draw on the expertise of NAIT, SAIT and ACCESS.
	(ii) Make arrangements with other institutions to share costs, the use of facilities, programs, etc.

2. Major Impact: Demands for Accountability

Impact Area	Possible College Adjustments
a. Planning	(i) Use inventive, future-oriented planning to maintain an appropriate volume of services and to cope with change.
	(ii) Develop a greater commitment to integrated, longer-term planning.
	(iii) Assess requirements of the new student population by both obtaining demographic data and interacting with students to understand their needs.
b. Funding	(i) Generate alternate sources of revenue by challenging industry to assist with resources such as funds, space, and equipment.
	(ii) Develop collective bargaining skills, learn to deal with the union mentality and accommodate faculty demands where possible.
	(iii) Devise means of program delivery which generate profit.
c. Liaison with Industry	(i) Monitor industry's requirements and training capabilities.
	(ii) Get more industry and business representatives on advisory committees and boards of governors.

c. Liaison with Industry (continued)	(iii)	Engage in joint educational programming such as work-study programs.
	(iv)	Enhance liaison with industry to develop mutual understanding.
d. Liaison with Government	(i)	Work with government to obtain accurate regional demographic data and manpower requirements.
	(ii)	Develop lobbying skills and accommodation strategies; present alternate proposals if priorities differ.
e. Effectiveness and Efficiency	(i)	Reallocate resources carefully, maximizing capital assets usage, transferring government support to operating needs, and increasing short-run strategies.
f. Liaison with the Public	(i)	Develop new approaches to accountability.
	(ii)	Enhance college image to increase credibility.

From the above it can be seen that many policy decisions would be extracted from these practical suggestions for action in anticipation not only of increased demand for Technological Training and Retraining but also of many other pressures emerging out of a turbulent environment. Major policy decisions could be made in the areas of Programming, Delivery Systems, Planning, and Funding, with lesser but still significant policy decisions to be made in the areas of Liaison with Industry as well as Government, and in Faculty Affairs, and Facilities and Services.

The Major Impacts of Demands for Accountability and Demands for Flexibility identified in Round II could be met to a large extent by these suggestions for Possible College Adjustments.

Summary of Findings

The purpose of Round III was to have respondents analyze the potential influence of 15 of the Major Environmental Forces identified in Round II on the specific policy area of Technological Training and Retraining, projected in Round II as being the most important environmental force having an impact on community colleges in the next decade. In addition, panelists were requested to suggest ways that colleges could adjust to each environmental force when considering future policy decisions in the area of Technological Training and Retraining.

A rank-ordered list of Influential Forces on Future Policy Decisions regarding Technological Training and Retraining in the Next Decade was developed through the use of a weighting scheme similar to that used in Round II. Of the 11 categories thus developed, the first six forces when considered in relation to Technological Training and Retraining, were perceived in Round III as more important or as important as perceived in Round II in relation to the general environment. These six forces might be entitled Major Influential Forces on Technological Training and Retraining and are as follows:

1. Intensified Development of Resource Industry
2. Growing Alberta Population
3. Industrial Expansion
4. Computer Technology
   Government Policy of Fiscal Restraint
5. Decentralization of College Services by Region.

An analysis of Hall's Typology for Round III reveals that the relative importance of force types remained unchanged from those in Round II although the weighting of each group was somewhat reduced.

From a total of 351 responses regarding Possible College Impacts resulting from the influence of the Major Environmental Forces on Technological Training and Retraining, 79 unique suggestions emerged. These were divided among 12 Impact Areas. Major policy decisions could be made in the four most significant areas: Programming, Delivery Systems, Planning, and Funding, while significant policy decisions could also occur in the four areas of Liaison with Industry, Liaison with Government, Faculty Affairs, and Facilities and Services. These major policy decisions could to a large extent meet the Major Impacts identified in Round II by answering demands for both accountability and flexibility.

GROUP DIFFERENCES

Two of the sub-problems stated in Chapter V related to sub-group differences; specifically, the identification of differing opinions between the two sub-panels of the study: Alberta community college presidents; and Alberta Advanced Education and Manpower officials. The two questions asked were, "Are the views of the two sub-panels similar regarding the identification of the major environmental forces?" and "Are the views of the two sub-panels similar regarding the influence that these major environmental forces will have on policy development in the colleges in the next decade?" Sub-panel differences were analyzed for Rounds II and III in turn.

Round II

Through the use of the t-test, significant differences at the .05 level were identified in 5.9% of questionnaire items for either Likelihood, Impact, or both. Detailed analysis of the results of the t-test are available in Table 37. In addition, the items of

Table 37

Items of Significant Difference, Identified by the t-Test for Groups 1[1] and 2[2], Round II

Environmental Force	Rating Scale	Questionnaire Item	Group	Number of Respondents	Mean	SD	Pooled Variance Estimate 2-Tail Probability
Government Priorities among All Sectors	L[3]	P11	1	9	1.3	0.5	0.027
			2	7	2.0	0.6	
	I[4]	P11	1	9	1.4	0.5	0.010
			2	7	2.1	0.4	
Government Priorities within the Area of Education	L	P12	1	10	1.4	0.5	0.047
			2	7	2.1	0.9	
	I	P12	1	10	1.4	0.5	0.025
			2	7	2.3	1.0	
Urbanization	L	D4	1	10	1.4	0.5	0.022
			2	7	2.1	0.7	
Professions and Occupations Legislation	L	L8	1	10	2.3	0.7	0.012
			2	7	1.4	0.5	
	I	L8	1	10	2.6	0.7	0.047
			2	7	1.9	0.7	

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[1] Group 1 = 10 Alberta community college presidents.

[2] Group 2 = 7 Alberta Advanced Education and Manpower officials.

[3] L = Likelihood of Occurrence in the Next Decade.

[4] I = Degree of Impact on Alberta's Community College System.

Table 37[1,2] (continued)

Environmental Force	Rating Scale	Questionnaire Item	Group	Number of Respondents	Mean	SD	Pooled Variance Estimate 2-Tail Probability
Private Sector Funding Increase	I[4]	L10	1	10	2.7	0.8	0.043
			2	7	1.9	0.7	
Changes in Human Rights Legislation	L[3]	L4	1	10	1.9	0.3	0.021
			2	7	2.4	0.5	
Strained College-University Relations	I	P13	1	10	1.9	0.7	0.022
			2	7	2.7	0.5	
Questioning of Traditional Values	L	C/S10(f)	1	10	2.6	0.7	0.047
			2	7	1.9	0.7	
World-wide Economic Depression	L	E15	1	10	2.1	0.7	0.026
			2	6	3.0	0.6	

[1] Group 1 = 10 Alberta community college presidents.

[2] Group 2 = 7 Alberta Advanced Education and Manpower officials.

[3] L = Likelihood of Occurrence in the Next Decade.

[4] I = Degree of Impact on Alberta's Community College System.

disagreement between the two groups are ordered by significance (percentage of respondents who rated Likelihood and Impact as either 1, Very Likely, High Impact, or 2, Likely, Moderate Impact) in Table 38. It can readily be seen that only one environmental force, Government Priorities among All Sectors occurred on the final list of 16 Major Environmental Forces identified in Round II. Therefore a closer look at the nature of the disagreement between the two groups on this item is warranted.

Government Priorities among All Sectors was rated as Significant by 82.35% of respondents and as Highly Significant (Very Likely, High Impact) by 29.41% of respondents. Among the Reasons for Importance cited were the limitation of public support for post-secondary education, the demand for greater accountability from the colleges, the impetus for colleges to seek funding elsewhere, the determination of regional expansion rate, and the dependence on government grants at the expense of college autonomy. College presidents believed that this force was more likely to occur (mean = 1.3) while Advanced Education and Manpower officials felt it was less likely to occur (mean = 2.0). College presidents felt that the impact of this force would be quite high (mean = 1.4) although there was less agreement among them (S.D. = 0.5) while Advanced Education and Manpower officials believed that the impact would be only moderate (mean = 2.1) and agreed more about this view (S.D. = 0.4). While both groups considered Government Priorities among All Sectors to be a Major Environmental Force, college presidents considered it more significant than did government officials.

Table 38

Items of Disagreement between Groups 1[1] and 2[2], Round II by Significance[3]

Environmental Force	Significance Perceived by Respondents (%)
Government Priorities among All Sectors	82.35
Government Priorities within the Area of Education	76.47
Urbanization	76.47
Professional and Occupations Legislation	64.71
Private Sector Funding Increase	64.71
Changes in Human Rights Legislation	58.82
Strained College-University Relations	52.94
Questioning of Traditional Values	41.18
World-wide Economic Depression	35.29

[1] Group 1 = 10 Alberta community college presidents.

[2] Group 2 = 7 Alberta Advanced Education and Manpower officials.

[3] Significance = percentage of respondents who rated Environmental Forces in Round II as either 1 or 2 for Likelihood of Occurrence in the Next Decade (1 = Very Likely, 2 = Likely) and 1 or 2 for Degree of Impact on Alberta's Community College System (1 = High Impact, 2 = Moderate Impact).

Although the next most significant item of disagreement was not identified as a Major Environmental Force, it was considered Highly Significant by 41.18% of respondents and Significant by 76.47% of respondents. The force, Government Priorities within the Area of Education, again was deemed more likely to occur by college presidents (mean = 1.4) with greater impact (mean = 1.4), while government officials felt that the force was only moderately likely to occur (mean = 2.1) with only moderate impact (mean = 2.3). The presidents demonstrated much more agreement on their opinion (S.D. = 0.5 in both cases) than did the Advanced Education and Manpower officials (Likelihood S.D. = 0.9, Impact S.D. = 1.0).

It appears that the area of government priorities, both generally and within the field of education, was viewed differently by the two sub-panels. Presidents believed that the forces were more significant in their impact on college development; government officials felt they were less significant.

Other items of disagreement considered as more important forces by college presidents were (in decreasing order of significance): Urbanization; Changes in Human Rights Legislation; Strained College-University Relations; and a World-wide Economic Depression. Forces considered more important by government officials included: Professions and Occupations Legislation; Private Sector Funding Increase; and Questioning of Traditional Values.

From the perspective of Hall's Typology (Table 39), it is interesting to note that Legislative and Political Forces were the most disputed (three items each), while there was only slight

Table 39

Hall's Typology and Items of Disagreement
Round II

Hall's Typology	Items of Disagreement	Sub-Panel Considering Item More Significant
Legislative Forces	Professions and Occupations Legislation	Group 2[1]
	Private Sector Funding Increase	Group 2
	Changes in Human Rights	Group 1[2]
Political Forces	Government Priorities among All Sectors	Group 1
	Government Priorities within the Area of Education	Group 1
	Strained College-University Relations	Group 1
Economic Forces	World-wide Economic Depression	Group 1
Demographic Forces	Urbanization	Group 1
Cultural/Societal Forces	Questioning of Traditional Values	Group 2
Technological Forces	--	--
Ecological Forces	--	--

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[1] Group 2 = 7 Alberta Advanced Education and Manpower officials.

[2] Group 1 = 10 Alberta community college presidents.

disagreement over Economic, Demographic, and Cultural/Societal Forces (one item each). No disagreement surfaced over either Technological or Ecological Forces.

In summary, then, group differences arising over the importance of certain environmental forces in Round II focused on Legislative and Political Forces. College presidents agreed about the importance of all the Political Forces in dispute, namely: Government Priorities among All Sectors; Government Priorities within the Area of Education; and Strained College-University Relations; while government officials believed that they all were less significant. Government officials agreed that two of the three Legislative Forces were more important, specifically: Professions and Occupations Legislation; and Private Sector Funding Increase; while college presidents viewed Changes in Human Rights Legislation as significant. Presidents also viewed the Economic Force of a World-wide Economic Depression and the Demographic Force of Urbanization as important, while government officials believed that the Cultural/Societal Force of Questioning of Traditional Values was significant.

Round III

As in Round II, the t-test was used to determine significant differences at the .05 level between Alberta community college presidents and Advanced Education and Manpower officials. Only one item was significant, namely a Growing Alberta Population, rated as the second Major Influential Force on Technological Training and Retraining (see Table 40). College presidents believed that this force would be more influential on policy development (mean = 1.2),

Table 40

Items of Significant Difference, Identified by the t-Test for Groups 1[1] and 2[2], with Frequency of Responses, Round III

Influential Force	Questionnaire Item	Group	Number of Respondents	Mean	SD	Pooled Variance Estimate 2-Tail Probability	Frequency of Responses 1	2	3	4
Growing Alberta Population	1	1	10	1.2	0.4	0.035	8	2	-	-
		2	7	1.7	0.5		2	5	-	-

[1] Group 1 = 10 Alberta community college presidents.

[2] Group 2 = 7 Alberta Advanced Education and Manpower officials.

while government officials believed it would be somewhat less influential (mean = 1.7). There was more agreement among the presidents (S.D. = 0.4) than among government officials (S.D. = 0.5). A glance at the frequency of responses for each of the two groups shows a near-perfect reversal of opinions: college presidents generally rated influence as high with only two rating it as moderate, while only two government officials rated it as high, the majority rating it as moderate. It is likely that the disagreement over this force's influence led to its reversal with Intensified Development of the Resource Industry in terms of priority from Round II to Round III.

The Major Environmental Force in Round II, Government Priorities among All Sectors, which elicited significant disagreement between the two groups was no longer an item of significant difference in Round III when considered in relation to the policy area of Technological Training and Retraining.

Summary of Findings

In both Rounds II and III one major item of significant difference was identified at the .05 level between Alberta community college presidents and Advanced Education and Manpower officials, although in Round II eight other forces not considered major drew differing responses. In Round II, the Major Environmental Force which elicited differing opinions was Government Priorities among All Sectors which college presidents felt was more likely and would have greater impact on colleges, while government officials believed it was less likely and would have less impact.

In Round III, the same Major Environmental Force was no longer considered significant when viewed in relation to policy development in the area of Technological Training and Retraining. Instead, however, disagreement arose over another Major Environmental Force from Round II, now considered a Major Influential Force on Technological Training and Retraining, specifically, a Growing Alberta Population Again this force was deemed more influential by college presidents and less influential by government officials.

Overall, it can be generalized that there was very little disagreement between the two groups with regard to the rating of Likelihood, Impact, and Influence of environmental forces.

RESPONDENTS' COMMENTS

Round I

Round I sparked a total of six additional comments which in turn generated 12 responses in Round II (see Table 41). Disagreement arose over two comments made regarding Technological Forces as illustrated below:

Round I	Round II
There are no technologies which are currently not known which will contribute to or influence postsecondary education in Alberta during the 1980's.	Agree.
	Not true.
	Agree. Educational technology will not have significant impact in the '80's or even in this century.

But for the most part, comments tended to support those made in the previous round as in the example below:

Table 41

Summary of Respondents' Comments, Rounds I-III

Area of Comment	Round I	Round II			Round III	Total Comments per Force Type
	Additional Comments	Comments Generated by Round I	Specific Comments	Additional Comments	Specific Comments	
Technological Forces	3	6	17	8	3	37
Legislative Forces	-	-	12	3	-	15
Political Forces	-	-	16	3	4	23
Economic Forces	-	-	12	2	14	28
Demographic Forces	1	-	-	-	2	3
Ecological Forces	1	1	2	1	-	5
Cultural/Societal Forces	-	-	6	1	2	9
General Comments	1	5	-	5	9	20
Total	6	12	65	17	34	140

Round I	Round II
Colleges will be getting many mixed messages resulting from the difficulty of government, local citizens, faculty, and students to have a common understanding of what is going on around them.	As it does now.
Western society in general will undergo a turbulent shift from a mechanistic world view characterized by hierarchies and specializations toward an ecological world view characterized by networks and interdependence.	I question whether it will go this way or a more science/technology based society.
For this reason it will be a decade of considerable tension especially for colleges with inflexible administrative structures.	This is so now. True. High impact. Yes.

All comments are reproduced in Appendix 6.

Round II

Comments specific to individual items in the Round II questionnaire amounted to a total of 65 distributed in the following manner: Technological Forces, 17 comments; Legislative Forces, 12 comments; Political Forces, 16 comments; Economic Forces, 12 comments; Demographic Forces, no comments; Ecological Forces, 2 comments; and Cultural/Societal Forces, 6 comments. These ranged from simple question marks and asterisks to rather lengthy sentences.

Although the above-mentioned comments are interesting from a content perspective, for the purpose of this study, the most revealing remarks occurred in the Additional Comments section which followed each type of force in Round II and in the General Comments Section at the end of Rounds II and III.

The Additional and General Comments generally fell into two categories: those related to the content of the study; and those related to the administration of the study (see Table 42). The content-related comments are available in Appendix 7, while the study-related items are discussed below.

In Round II a comment related to Technological Forces indicated that the study monitor had demonstrated an error in editorial judgement by not making the microprocessor a separate technological force as he believed it to be "the single most important technological development of the next twenty years." An article outlining the electronics revolution was sent to support the case (Appendix 7). In addition, this respondent felt that Telidon had been misread as Television and that the videodisc had been omitted from the technological developments mentioned although it was likely to have a greater impact on the educational process than most.

One comment related to Political Forces indicated frustration in distinguishing between Legislative and Political Forces while another comment indicated that the spectrum of forces identified was excellent. Under Economic Forces, two comments related to the difficulty panelists had experienced separating Political from Economic Forces. One suggested that the panelist had had trouble judging Impact when the Reasons for Importance in some cases were contradictory, while the other suggested repetition existed in the two forces Industrial Expansion and Intensified Development of the Resource Industry.

In the General Comments section at the end of the Round II

Table 42

Analysis of Additional and General Comments, Rounds II and III

	Round II		Round III	
Area of Comment	Content Related	Study Related	Content Related	Study Related
Technological Forces	7	1		
Legislative Forces	3	-		
Political Forces	1	2		
Economic Forces	-	2		
Ecological Forces	1	-		
Cultural/Societal Forces	1	-		
General	5	2	6	3
Total	18	7	6	3

questionnaire, one panelist suggested that many of the forces listed were current rather than future ones and that some cross impact analysis would be beneficial. Another panelist commented on the contradictory nature of certain Reasons for Importance but indicated that the questionnaire was well constructed and participation in the study had been enjoyable.

Round III

In Round III, no Additional Comments were solicited, but certain remarks provided as Possible College Adjustments were judged as Specific Comments rather than suggestions for action by the study monitor. In all, 25 responses fell into this category and are recorded in Table 41 by force type. Fourteen comments related to Economic Forces, four related to Political Forces, two related to Demographic Forces, three related to Technological Forces, and two to Cultural/Societal Forces. No comments were made regarding either Legislative or Ecological Forces. A complete listing of comments is available in Appendix 8.

The Specific Comments relate to particular environmental forces regarding the policy area of Technological Training and Retraining. Most are of general interest and relate to content. Of particular interest to this study, however, are remarks made in item 13, Growth in the Service Sector, which moved from seventh to ninth in rank order from Round II to Round III. All three comments warned of the importance of this environmental force and suggested that it was being overshadowed by considerations of Technological Training and Retraining:

> The need for skilled white-collar workers has not yet been recognized by government policy to the extent that the need for trained blue-collar workers has. The balance should be redressed. One only has to read the careers sections of local newspapers to see the pressing needs.
>
> Be cognizant of the importance of growth in the service sector as compared with the need for professionals.
>
> This is the fastest growing sector. Colleges would do well to look at it in terms of their activity rather than blindly pursue technology training, much of which may be better done in the private sector.

Most of the suggestions for Possible College Adjustments were similar to those for such items as a Growing Alberta Population and Technological Training and Retraining. It is the opinion of the study monitor that the interrelationship of Growth in the Service Sector and Technological Training and Retraining as two growing and possibly conflicting program areas escaped most panelists; hence its lowered rank order.

A total of nine General Comments was received in Round III, six relating to content and three to the administration of the study. Several content-related comments stressed that Technological Training and Retraining should not be overemphasized as to do so would be short-sighted; rather a balance between it and other program types should be maintained. One comment warned that training might be done by industry in the future if colleges could not be flexible enough to meet the kinds of demands likely to be made. One comment implied that although fiscal restraint might become a force in the future, it was not one now. One panelist suggested that respondents had been overly concerned with current environmental forces rather than taking a long-term view.

One study-related comment suggested that the preoccupation with Technological Training and Retraining might reflect the population selected for the study, meaning a preponderance of technically-oriented institutional representation or of government representation. Another comment admitted difficulty in making a conceptual distinction among environmental forces. A third comment suggested that participation in the study had been an interesting exercise.

Summary of Findings

In all three rounds, a total of 140 comments were recorded in addition to the standardized responses solicited by the questionnaire. This indicates a high degree of interest on the part of panelists in the topics under discussion. Comments regarding Technological, Economic, and Political Forces and the General Comments section provoked the most discussion. Additional and General Comments generally related to either study content or study administration. Throughout the study, comments revealed a certain difficulty experienced by panelists in distinguishing among environmental forces. In Round III comments revealed that an overemphasis on Technological Training and Retraining would be short-sighted.

SUMMARY

This lengthy chapter has provided a description of the data received in the study and an analysis of that data. Each round of the study was examined sequentially. An overview of the purpose of each round was provided, followed by a description of the data generated, an analysis of findings, and a summary. The differences between the two sub-panels were examined. And lastly, the Specific, Additional, and General Comments made by respondents were discussed.

In Round I, 102 Environmental Forces were identified along with 258 Reasons for Importance. According to Hall's Typology, the largest number of forces identified were Political Forces, followed in descending order by Cultural/Societal, Technological, Legislative, Economic, Demographic, and Ecological Forces. The most agreement regarding identification of forces occurred in the Demographic category while the least occurred in the Ecological category. Half of the forces identified related to the general environment while a third related specifically to community colleges. The rest related either to pressure groups or to education in general. Nearly all of the Reasons for Importance referred to the direct or indirect impact of forces on the colleges.

The purpose of Round II was to rate the Environmental Forces identified in Round I for Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System. A list of 16 Major Environmental Forces was identified and rank ordered into eight categories of decreasing significance: (1) Technological Demand for Training and Retraining; (2) Growing Alberta Population; (3) Intensified Development of the Resource Industry; (4) Inflation, Industry as a Pressure Group, and Increasing In-migration; (5) Buoyant Economy, Decentralization of College Services by Region, and Regional Expansion of Population; (6) Faculty as a Pressure Group, Government Policy of Fiscal Restraint, Industrial Expansion, and Computer Technology; (7) Growth in the Service Sector; and (8) Government Priorities among All Sectors and Different Student Population. In terms of Hall's Typology, Economic Forces were the most significant, followed by Political and Demographic Forces. Two Major Impacts were determined from the Reasons for Importance cited by respondents in Round I for the Major Environmental Forces identified in Round II. These Major Impacts that colleges would experience as a result of these forces were: (1) Demands for Flexibility and (2) Demands for Accountability. Demands for Flexibility was considered more significant than Demands for Accountability as it received 19 citations as opposed to 11 citations for the other. Ten Tentative Impact Areas in the colleges were proposed also based on the Reasons for Importance advanced in Round I. Areas related to Demands for Flexibility included: (1) Revision, Expansion, and Creation of Programs; (2) Current Program Cuts; (3) New Scheduling Approaches; (4) Non-traditional Delivery Systems Development; and (5) Loss in Flexibility of Staffing. Areas related to Demands for Accountability included: (1) Accountability and Loss of Autonomy; (2) New Ways of Funding; (3) Efficiency and Productivity Demands; (4) Need to Stay Current; and (5) Interaction with the Private Sector.

The purpose of Round III was to focus on the potential influence of 15 of the Major Environmental Forces on a specific policy decision area, specifically Technological Training and Retraining, identified in Round II as the most important environmental force in the coming decade. In addition, respondents suggested ways in which colleges could adjust to the interaction of each force with Technological Training and Retraining when considering future policy decisions. Six

Major Influential Forces on Technological Training and Retraining emerged, namely: (1) Intensified Development of the Resource Industry; (2) A Growing Alberta Population; (3) Industrial Expansion; (4) Computer Technology; (5) Government Policy of Fiscal Restraint; and (6) Decentralization of College Services by Region. The relative importance of environmental force types according to Hall's Typology remained unchanged from Round II, although each type declined somewhat in its weighted value.

The Major Impacts of the environmental forces identified in Round II remained consistent with responses received in Round III. Demands for Flexibility remained more significant than Demands for Accountability by receiving 204 responses as opposed to 147 responses. In conjunction with the Tentative Impact Areas which emerged from responses in Round I, responses in Round III were analyzed for similarities and differences. The twelve Impact Areas which resulted were similar in scope but more specific in focus. The Impact Areas experiencing Demands for Flexibility included: (1) Programming; (2) Delivery Systems; (3) Faculty Affairs; (4) Facilities and Services; (5) Scheduling and Admissions; and (6) Liaison with Other Institutions. Impact Areas feeling Demands for Accountability included: (1) Planning; (2) Funding; (3) Liaison with Industry; (4) Liaison with Government; (5) Effectiveness/Efficiency; and (6) Liaison with the Public. The 351 responses regarding Possible College Adjustments resulted in 79 unique suggestions for action divided among these twelve Impact Areas. Based on the number of responses advanced for each Impact Area, four areas were considered highly significant for future policy decision making: (1) Programming; (2) Delivery Systems; (3) Planning; and (4) Funding; while four others were considered significant for future policy decision making: (1) Liaison with Industry; (2) Liaison with Government; (3) Faculty Affairs; and (4) Facilities and Services.

Group differences between the two sub-panels of Alberta community college presidents and Alberta Advanced Education and Manpower officials were sought for both identification of Major Environmental Forces and rating of influence of these forces. In Round II only one item of significant difference at the .05 level was identified: Government Priorities among All Sectors. College presidents believed that this force was more likely and would have a greater impact on the system than did government officials. In Round III there was no longer disagreement over this item, but rather over the influence of a Growing Alberta Population. Again college presidents felt that this force would be more influential on policy decisions in the area of Technological Training and Retraining, while government officials believed it would be less influential. Overall there was very little disagreement between the two sub-panels when rating Likelihood, Impact, and Influence of environmental forces.

Specific, Additional, and General Comments over the three rounds of the study totalled 140 comments in all, demonstrating a high degree of interest on the part of panelists in the topic. Technological, Economic, and Political forces received the most discussion, followed by the General Comments section. Remarks related either to content of the study or administration of the study. Differentiating among the environmental force types suggested by

Hall's Typology caused some frustration in a number of panelists. In addition, overlap of forces was demonstrated in Round III by the use of referral responses. Also in Round III, several comments suggested that an overemphasis on Technological Training and Retraining would be short-sighted.

Chapter VII

SUMMARY, CONCLUSIONS AND IMPLICATIONS

The purpose of this final chapter is to provide a summary of this study, and to draw some conclusions and implications based on the research findings. The summary section of the chapter reviews the purpose and problems of the study, its focus, justification, and the conceptual and methodological frameworks. Then the study's respondent groups are identified and the instrument development, data collection, and data treatment procedures described. Lastly, seven major findings are identified. Conclusions drawn from the study involve three topics: the postsecondary setting, environmental theory, and the Delphi method. Finally some implications are proposed in the form of five scenarios, twelve meta-policy propositions with specific suggestions for action, and some proposals for further research.

SUMMARY OF THE STUDY

This section provides a review of the purpose of the study, research design, data collection and analysis procedures and research findings.

Purpose and Problems of the Study

The purpose of the study was to provide a pre-planning arena for free and creative discussion by postsecondary experts regarding possible impacts of environmental forces on Alberta community colleges during the next decade and possible institutional responses in the area of policy making. In order to address this topic more specifically, three problems in the form of questions were identified:

1. What do the postsecondary experts view as the major environmental forces which will have an impact on the development of Alberta community colleges in the eighties?

2. What impact do the postsecondary experts perceive these environmental forces having on the development of the colleges?

3. What implications or meta-policy considerations can be derived from these perceptions?

Of lesser significance, but available from the method employed and the data generated during the course of the study, were three sub-problems, again in the form of questions:

1. Do the sub-groups in the study agree on the identification of the major environmental forces?

2. Do the sub-groups in the study agree regarding the influence these major environmental forces will have on policy development?

3. Is the Delphi method a useful research methodology for analyzing a complex issue such as this?

Focus of the Study

The focus of the study moved from a highly generalized view of the environment to some particular actions colleges might take in response to major environmental influences on a specific policy decision area. Sequential activities in the study moved from the identification of environmental forces likely to relate to community college development, to a rank ordering of major environmental forces, next to the likely impact of these forces on the colleges, to the rank ordering of the most influential forces on a specific policy decision area, and finally to possible college responses to these forces.

Justification for the Study

The study was justified on two counts. First of all, organization theory related to institutions and their environments has identified an increasingly turbulent environment with which organizational survival is inextricably bound up. Therefore, the more organizations are aware of their environments, the more successfully they can interact with them. Secondly, postsecondary planners have indicated that improved methods of educational planning are essential, involving more inventive, future-oriented approaches, if postsecondary institutions are to remain relevant to environmental demands placed on them. Therefore, a pre-planning activity such as this study provided which encouraged a ten-year perspective among postsecondary experts could be the precursor to other future-oriented planning and policymaking activities.

Conceptual Framework

The general conceptual framework for the study was derived from an environment-centered organizational perspective based on the work of several theorists. Emery and Trist (1969) suggested that the causal texture of the environment was produced by the interaction of environmental forces with each other and that knowledge of this interaction might be vital to organizational survival. Seashore and Yuchtman (1968) maintained that the success of an organization depended on its ability to acquire scarce resources and Van de Ven (1976) determined that this need to acquire resources would result in the loss of some institutional autonomy and the involvement in interorganizational relationships. Based on the work of Thompson and McEwen (1958) and Thompson (1967), Pfeffer and Salancik (1978) suggested strategies to develop organizational control of environmental uncertainty.

The study attempted to have participants review environmental forces which might have relevance for community colleges and to consider the interactive nature of the most important of these forces on policy development in a particular area. Judging from their comments, it was evident that resource dependence, loss of autonomy, and interorganizational relationships were products of a turbulent environment. In addition, the study attempted to probe institutional responses to environmental uncertainty and to outline some possible response areas to be summarized as meta-policy considerations.

The specific conceptual framework employed for the development of questionnaires and the analysis of data was based on Hall's Typology (1972) of general environmental forces. He indicated that the general environment was made up of technological, legal, political, economic, demographic, ecological, and cultural factors.

Methodological Framework

The methodological framework employed in the study was that of a policy Delphi, developed by Turoff in 1969 as a specialized form of Delphi to explore policy issues rather than to achieve consensus on a topic. A policy Delphi study conducted by Jillson in 1974 on the National Drug-Abuse Policy proved a general model for this study, while aspects of Delphis conducted by Dyck (1970) and Konrad et al. (1976) provided additional guidance. Methodological features of the study included the combination of informed judgements about a future policy decision area, identification of reasons for importance of all forces identified, and avoidance of forced convergence. The major limitation of the study was seen as the use of a single study monitor rather than a design team, a situation resulting from the educational nature of this enterprise.

Respondents in the Study

The respondents in the study comprised two sub-panels. The first sub-panel consisted of the ten community college presidents in the Alberta public college system. The second sub-panel consisted of seven senior officials in Alberta Advanced Education and Manpower, ranging from the Deputy Ministerial to the Directorship level, all with direct responsibilities in the area of community college education. The two groups were selected to provide a degree of dialogue and debate regarding environmental issues.

Instrument Development

The study consisted of three rounds of questionnaires which were developed sequentially, based on the data generated in the previous round. Each questionnaire was either field-tested by institutional presidents not involved in the study or critiqued by independent observers. Revisions were made according to recommendations thus forwarded.

The Round I questionnaire, based on Hall's Typology, was open-ended in nature, requesting the identification of specific forces for each of seven environmental components (technological, legislative, political, economic, demographic, ecological and cultural). The reasons for the respondent's selection of each force were solicited. An educational handout entitled "What is a Policy Delphi?", written by the study monitor, accompanied the first questionnaire, along with a personal data sheet to be completed by respondents.

The Round II questionnaire consisted of the 102 forces and their reasons for importance identified in Round I. These forces were grouped according to Hall's Typology and ratings were requested on two four-point scales for Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System. The questionnaire was accompanied by a Rating Key which provided a detailed explanation of the meaning of each of the four possible responses.

The Round III questionnaire was composed of 15 items, each representing the interactive nature of 15 Major Environmental Forces which had emerged from ratings in Round II with the sixteenth, most highly-rated force, Technological Training and Retraining. The rating of the degree of influence of each force on this policy decision area was requested, again on a four-point scale, and possible college adjustments to these interacting forces solicited. A Rating Key was provided which gave a detailed explanation of the meaning of each of the four possible responses.

Data Collection

In Round I, 16 of the 18 questionnaires dispersed were returned. One government official withdrew from the study and one college was in the process of replacing their president at the time of distribution. For both Rounds II and III, 17 respondents, including the new president, returned their completed questionnaires, making the response rate for the study unusually high at 96%. During the course of the study several questionnaires were lost and file copies had to be retrieved. In each round, response time took two to three weeks longer than anticipated. Overall, four weeks were lost in this manner, and the study had to be conducted with three rounds instead of four as originally planned to meet the deadline set for completion.

Data Treatment

The data generated by this study were analyzed by both qualitative and quantitative content analysis procedures. Qualitative methods included the inductive development of categories and the summarizing of responses. The highly judgemental nature of both of these methods was offset somewhat by procedures which were consistently adhered to. Categories were developed through a routinized procedure involving unitization of comments, coding, sorting, category determination, and resorting. Responses were summarized through a process which compiled similar responses into single statements and edited unique responses.

Quantitative methods were more rigorous and included frequency analysis, scaling for importance, and contingency analysis. Frequency analysis was used to determine content by counting procedures. Such activities as the determination of frequency of responses and the identification of group differences were accomplished in this manner. Scaling for importance was used to apply a fixed value to content and to place it in a graded series of decreasing importance. The significance of forces was identified by the use of percentages and weighting factors and hence it was possible to rank order content. Contingency analysis was used to correlate, compare, and synthesize content once initial analysis had been conducted. Information gleaned in this way included the determination of Major Environmental Forces, correlation of forces with Hall's Typology, comparison of findings in Rounds II and III, and correlation of Impact Areas with College Adjustment Areas.

Summary of Research Findings

1. Identification of Environmental Forces

Analysis of Round I data revealed that 102 Environmental Forces had been identified in the seven categories provided and they were accompanied by 258 Reasons for Importance. The largest number of forces occurred in the Political Forces category, followed in descending order by Cultural/Societal, Technological, Legislative, Economic, Demographic, and Ecological Forces. The most agreement regarding force identification occurred in the Demographic category while the least occurred in the Ecological group. Half of the forces related to the general environment while a third related specifically to community colleges. Most of the Reasons for Importance referred to the direct or indirect impact of environmental forces on the colleges.

2. Identification of Major Environmental Forces

When the Environmental Forces identified in Round II were rated for Likelihood of Occurrence in the Next Decade and Degree of Impact on Alberta's Community College System, a rank-ordered list of 16 Major Environmental Forces emerged organized into eight categories of decreasing significance. They were:

1. Technological Demand for Training and Retraining
2. A Growing Alberta Population
3. Intensified Development of the Resource Industry
4. Inflation
   Industry as a Pressure Group
   Increasing In-migration
5. Buoyant Economy
   Decentralization of College Services by Region
   Regional Expansion of the Population
6. Faculty as a Pressure Group
   A Government Policy of Fiscal Restraint
   Industrial Expansion
   Computer Technology
7. Growth in the Service Sector

8. Government Priorities among All Sectors

A Different Student Population.

According to Hall's Typology, Economic Forces were judged the most important, followed by Political and Demographic Forces. Technological and Cultural/Societal Forces received lesser mention, while Legislative and Ecological Forces did not appear in the consideration of major forces at all.

3. Projected Impact of the Major Environmental Forces on the Colleges

An analysis of responses in both Round I and III revealed that two Major Impacts were forseen for the colleges. These were:

1. Demands for Flexibility
2. Demands for Accountability.

Based on the number of responses related to Demands for Flexibility over the number related to Demands for Accountability, it was judged that Demands for Flexibility was seen as the more crucial of the two Major Impacts.

4. Projected Impact Areas of the Colleges to Experience Environmental Change

The Major Impacts were determined as likely to affect a number of administrative areas and functions in the colleges, referred to as Impact Areas. These Impact Areas were drawn from both the Reasons for Importance provided by respondents in Round I in support of the Major Environmental Forces identified in Round II and the suggestions for Possible College Adjustments proposed by respondents in Round III when considering a specific policy decision area. The

Impact Areas most likely to be affected by Demands for Flexibility were determined to be, in decreasing order of significance:

1. Programming
2. Delivery Systems
3. Faculty Affairs
4. Facilities and Services
5. Scheduling and Admissions
6. Liaison with Other Institutions.

The Impact Areas most likely to be affected by Demands for Accountability were identified as:

1. Planning
2. Funding
3. Liaison with Industry
4. Liaison with Government
5. Effectiveness/Efficiency
6. Liaison with the Public.

5. Identification of Major Influential Forces on Technological Training and Retraining

In Round III when 15 of the Major Environmental Forces were rated for degree of influence on the policy decision area emerging from the most important Major Environmental Force, Technological Training and Retraining, as identified in Round II, six Major Influential Forces on Technological Training and Retraining were identified. In descending order of influence they were:

1. Intensified Development of the Resource Industry
2. A Growing Alberta Population

3. Industrial Expansion
4. Computer Technology
   A Government Policy of Fiscal Restraint
5. Decentralization of College Services by Region.

The relative importance of forces according to Hall's Typology remained unchanged from Round II.

6. Identification of Highly Significant and Significant Impact Areas

The 351 suggestions received for possible college adjustments to the interaction of the Major Environmental Forces on the policy decision area of Technological Training and Retraining condensed into 79 unique statements divided among the 12 Impact Areas. Based on the number of responses per Impact Area, four areas were considered highly significant with regard to future policy decisions. These Impact Areas were:

1. Programming
2. Delivery Systems
3. Planning
4. Funding.

Four other areas were considered significant with regard to future policy decisions. These Impact Areas were:

1. Liaison with Industry
2. Liaison with Government
3. Faculty Affairs
4. Facilities and Services.

7. Analysis of Sub-panel Differences

Only one item of significant difference at the .05 level was identified in both Round II and Round III between the sub-panel of Alberta community college presidents and the sub-panel of Alberta Advanced Education and Manpower officials. In Round II, the force disagreed upon was Government Priorities among All Sectors which the presidents felt was more likely to occur with greater impact on the colleges than did government officials. In Round III, this was no longer an item of significant difference, and indeed was no longer considered significant at all in relation to the interaction of major forces with the policy decision area of Technological Training and Retraining. Instead, the item of significant difference between the two sub-panels became disagreement over the degree of influence A Growing Alberta Population would have on the policy decision area of Technological Training and Retraining. College presidents believed that this force would be more influential while government officials believed it would be less influential. In view of the total findings of the study, little disagreement between the two sub-panels was evident.

CONCLUSIONS

A number of general conclusions regarding various aspects of the study are presented for consideration. In particular, these relate to the postsecondary setting, to environmental theory, and to the Delphi method.

The Postsecondary Setting

1. The General Environment in the Next Decade

The first problem which this study addressed was the identification of the environmental forces likely to have a major impact on the development of Alberta community colleges in the eighties as viewed by Alberta community college presidents and Alberta Advanced Education and Manpower senior officials. The general environment thus perceived is best described in the form of a scenario as first developed in Chapter VI.

> The major challenges of the decade for Alberta's community colleges will be to meet the demands emanating from the resource extraction industry, and industry in general, to train technicians and retrain obsolete ones to keep pace with rapid advances in technology. As a result, colleges will find themselves frequently developing new programs and updating current ones, while some programs will be phased out altogether. In addition to technological programming, their offerings will be expanded to meet the needs of the growing service sector. Computer applications will become a basic component of many programs. In general, colleges will have to keep pace with new advances in knowledge and skill areas and should improve communications with the private sector.
>
> Colleges will have to demonstrate flexibility in serving the mature, part-time student population through new approaches to scheduling and the development of non-traditional delivery systems.
>
> Two major roadblocks are expected to hinder the colleges' expansionary plans. One is increased faculty unionization which will limit staffing flexibility. The other is a continued government policy of fiscal restraint in the area of education. Demands for efficiency and productivity will continue while a loss of autonomy will be experienced by the colleges. As a result they will turn to alternative funding sources in an attempt to fulfil their perceived mandates.

Aspects of this scenario and the sixteen Major Environmental Forces on which it is based can benefit from a broader discussion. The conclusions presented below are based on panelists' responses and comments for Rounds I and III. It will be noted that only thirteen topics are discussed due to overlap in the sixteen forces originally identified.

a. Industrial Expansion and the Demand for Training

The greatest change to be experienced by the colleges will come as a result of developments in the resource extraction, electronics, communications, and computer-related industries, although there may also be developments in the rapidly growing service sector as well which will also affect the colleges. An interesting article on electronic chips and microprocessors was provided by one of the respondents and is reproduced in Appendix 7. Colleges will be continually faced with demands to remain current with advances in order to provide relevant training and retraining opportunities for workers.

The fear was expressed by several respondents that colleges will react too slowly to technological developments to be effective. Funding to support both capital investment and program change must be readily available. Provision must be made for on-going faculty development. A concerted effort must be made to maintain close communication links with industry. Throughout the college system, a climate of innovation must be fostered. But as respondents indicated, if colleges are not sufficiently responsive to the needs of industry or if the training opportunities they provide are inappropriate, the bulk of industrial training may be assumed by the industries themselves. Some felt that this alternative might be advisable.

b. A Growing Alberta Population with a New Kind of Student

The rapid economic expansion foreseen for Alberta in this decade will be coupled with a population explosion equal to one-third of present numbers. The greatest proportion of this growth will result from the in-migration of Canadian workers in the 25-44 age group, prime clients for our community colleges. However, the demands they will place on the colleges will require unprecedented degrees of flexibility.

In the first place, the older students will continue to work and will attend college on a part-time basis. They will require flexibility in the scheduling of programs and courses and will need additional student services in such areas as student aide, counselling, and day care. Secondly, they will gravitate to industrial locations and demand that educational facilities come to them. This will result in the concerted use of varieties of distance and on-site education presently in early developmental stages, as well as the use of many forms of instructional packaging.

c. The Influence of the Resource Industry on Training

The proposed mega-projects in the resource extraction industry will result in demands for specialized training and specialized delivery systems as noted above. However; respondents believed that a danger exists. If funding is mainly provided for program development in high-demand areas, colleges will be effectively steered away from the development and maintenance of their humanities, arts, and social science components. Thus the educational balance essential to a growing society could be lost in the rush to obtain new funds.

d. Inflation

Inflation is likely to be with us for at least the next five years. This has serious implications for the budgeting process. Despite a growing economy and a growing population urging college expansion, administrators will continue economizing in the face of shrinking dollars. Difficult decisions will still have to be made regarding reductions in service, staffing, and programs. Funds will have to be reallocated in more effective and efficient ways as both government and the public continue to demand accountability.

e. Industry Increases its Influence

Growth in industry, predicted labour shortages, and the increased industrial tax base will encourage industry to exert more control over postsecondary education. The pressure placed by industry on government will result in more funds becoming available for expansion in desired areas. Close ties with industry will be essential if colleges are to provide what the labour market requires. At the same time, however, industry will be able to contribute resources, equipment, and assistance in many concrete ways.

f. In-migration

The influx of workers will have several effects for community colleges. As noted above, the larger student population will be part-time and frequently distant from the colleges. Many workers will be attracted from economically depressed areas of Canada and may be unskilled, requiring upgrading as well as technical training. The cross-current of ideas will create new demands for better educational, health, and leisure facilities and will upgrade Alberta's lifestyle in many ways.

g. A Buoyant Economy

The contradiction of a buoyant Alberta economy within an inflationary and frequently depressed Canadian and world economy will continue to attract immigrants as well as in-migrants. English as a Second Language facilities will have to be expanded. The strong labour market will lure away many of the traditional community college students (i.e., recent high school graduates) who will then return to swell the part-time population even further.

h. Regional Growth

While major population increases are expected in the areas of Medicine Hat, Red Deer, Calgary, Edmonton, and Fort McMurray, where college facilities already exist, itinerant and permanent populations will grow near the sites of resource extraction mega-projects. There appear to be two major implications for Alberta's community colleges.

The first implication is that of college specialization. While colleges in established centers struggle to maintain balanced programming while also expanding in high-demand areas, those colleges which serve the mega-project populations will tend to specialize in specific technological fields. This duality of purpose may place new strains on a college system which has been moving toward centralization and standardization over the past decade.

The second major implication is that colleges will be required to provide more decentralized services through additional campuses or field branches as well as through joint ventures such as consortia and brokered courses, and through the development of distance education capabilities such as mobile units, on-site training, and enhanced satellite, telephone, telidon and computer links. Jurisdictional disputes among the colleges will have to be resolved and duplication of services avoided.

i. Faculty's Growing Power

Many respondents viewed faculty as a major force in the 1980's. The provincial association is seen as gaining influence due to increased membership. Pressure will grow for unionization. Collective bargaining is anticipated to reduce flexibility in faculty contracts at a time when increased instructional flexibility is paramount to college survival. Joint problem solving rather than confrontation tactics must be employed to resolve this serious issue.

j. Government Restraint

Some respondents indicated that the increased demands for financial accountability and the steering effect on programming of available funds threaten college autonomy. It was also suggested that alternative fund raising activities would give rise to both new management responsibilities and new fiscal policies.

k. The Spread of Computers

The continued popularization of computer applications will affect programming in such areas as business, management, and secretarial sciences, but general computer literacy is likely to become essential for all students. Applications such as word processing and electronic information and retrieval systems will revolutionize the administration of the colleges themselves. Systems such as the Electronic Information Exchange System (EIES) can provide a computerized conferencing facility to enable geographically dispursed administrators to explore in-depth issues such as those addressed by this study at their leisure as well as to communicate messages and notices.

The use of computers as teaching tools will also become widespread, making coordination of course offerings among colleges feasible. Disagreement among respondents occurred over the capability of the colleges to make well-informed decisions regarding computers.

1. The Service Sector Ignored

Discussion was sparked by this environmental force, particularly when it was considered for cross-impact with the Demand for Technological Training and Retraining in Round III. Although the Planning Secretariat of Alberta Advanced Education and Manpower predicts a shift in employment patterns during this decade away from primary industries (mines, quarries, and oil wells) to tertiary industries (finance, insurance, real estate, and community, business, and personnel service), government policy to date has focused on technological training. Indeed many respondents did not see the possible conflicts which may emerge between the two major areas of program growth, one of which is attracting capital funds and public support while the other grows unheeded.

m. Overall Government Priorities

This is the only Major Environmental Force which polarized opinions between the two sub-panels of the study: the community college presidents and the officials from Alberta Advanced Education and Manpower. The presidents believed that the limitation of public support for postsecondary education was more likely to occur and would have greater impact on the development of the colleges than did the government officials.

However, in Round III, when respondents viewed this force in relation to the Demand for Technological Training and Retraining, no significant disagreement remained between the two groups. Both acknowledged that this particular component of postsecondary education is already a government priority.

n. Other Important Environmental Forces

Although for the purposes of this study, the sixteen Major Environmental Forces listed above were identified by respondents as providing the most important influence on the future direction of the colleges, twelve other forces were judged as nearly as important and should be mentioned as well. These forces were:

i. More Women in the Labour Force
ii. Civil Servants as a Pressure Group
iii. Taxpayers as a Pressure Group
iv. The Cost of Education
v. Fragmentation of the Family Unit
vi. The Changing Role of Women
vii. Government Priorities within the Area of Education

viii. Word Processing

ix. The Market Rate for Qualified Instructors

x. Satellite Communications

xi. An Aging Population

xii. Improved Data Storage and Retrieval.

2. The Impact of Environmental Forces on College Policy Development

The second problem which this study addressed was the determination of the impact of environmental forces on the future development of college policy. The study has shown that the environment will have an impact on college policy development in two major ways:

1. Demands for Flexibility
2. Demands for Accountability.

These Major Impacts will manifest themselves in a number of Impact Areas at the college level. A closer look at changes anticipated in these areas is in order, based on panelists' responses and comments.

Demands for flexibility will be felt in the following areas:

a. Programming

By far the most comments and suggests were elicited for the function of programming. Traditional forms of program evaluation must be replaced by more responsive measures, as colleges cannot afford to support obsolete programs for even one year. Contact with industry must be extensive in order to judge program relevance and monitor technological change. Program structures must be flexible enough to plug or unplug specific courses at will as skill demands change, and in the same fashion, course structures must also facilitate content change. Instructors must be sufficiently aware of change in the field to be able to quickly update old courses and develop new ones. If colleges are to attract students, the urgent need for course and program relevance must be acknowledged by the sufficient allocation of funds to support the changes required. Policies must be flexible enough at both government and college levels to ensure that program change can be effected appropriately.

Perhaps the concept of "program" itself should be reexamined in light of the needs of part-time students. Several respondents suggested that colleges restrict their offerings and concentrate on doing a few things well. This idea is supported by the pressures likely to be experienced due to regional expansion. The balance between technological and other types of programming remained a concern to many respondents who viewed the colleges as being unable to support their mission statements in the face of funding priorities. It seems that college program specialization is a likely result.

The major conclusion to be drawn regarding the impact of demands for flexibility on college programming is that appropriateness means survival. Therefore, every effort must be directed towards maintaining program relevance through the development of responsive policies and practices.

b. Delivery Systems

Demographic and economic projections are clear in their message that most future Alberta community college students will be part-time and many will be distant from any campus. These two facts have serious implications for both instructional methods and delivery of instruction.

Although colleges now pay lip service to part-time program enrolment, part-time students find themselves second-class citizens. Courses are sequential and are frequently offered only once a year. Thus the length of time required for a part-time student to complete a program stretches to unrealistic proportions. Secondly, these students often find that courses are scheduled at inconvenient times (such as day vs. evening), again limiting their ability to enrol. These basic scheduling problems can be resolved through the use of instructional packaging. A variety of exciting techniques can be employed to develop modularized and individualized courses. Instructors must be trained in instructional development techniques and incentives provided to encourage their role change from lecturer and classroom manager to designer and consultant. Colleges must be prepared to support the expensive start-up costs, keeping in mind the long-term savings which will be made by increased enrolment and lower instructional costs.

These new forms of instruction will easily adapt to distance situations. The communication possibilities of such systems as the Anik B satellite and Telidon coupled with the instructional techniques of modularized courses and instructor-consultants make distance education the most exciting educational innovation of the century.

The conclusion which must be drawn in considering alternative delivery systems is that future educational flexibility is worth the cost. Far sighted government and college policies must allow this potential to be realized.

c. Faculty Affairs

Although faculty members are part of the colleges, at the same time, they influence the environment in which the colleges function. Many respondents viewed successful faculty relations as the key to effective response to environmental change.

The largest single item in any college budget is faculty salaries. As efficiency of expenditure becomes more critical, the need arises to examine how much those salaries are contributing towards the attainment of college goals.

In fact there are now two faculty populations. As with students, part-time faculty is growing to a majority position. But like part-time students, part-time faculty are second-class citizens. Contracts are generally negotiated by full-time faculty and tend to reflect their interests, particularly their desire for greater security and smaller workloads. Many part-time faculty, on hourly wages, earn considerably less and have no security. The advantages afforded administrators through the use of part-time faculty include flexible selection, flexible workloads, and flexible locations. On the other hand, among the advantages enjoyed by the colleges through the participation of full-time faculty are a long-term commitment, valuable committee work, college representation in professional areas, and curriculum and discipline continuity and development.

The difficult issue of two faculty populations will have to be resolved very soon if colleges are to be able to direct their energies toward the pressing needs of programs and students. Faculty and administration should sit down together to explore the changing role of faculty. If the needs of both faculty populations can be adequately assessed, perhaps a new concept of "faculty" will emerge and a flexible new contract arrangement will be devised which will be satisfactory to all parties involved while the colleges continue to gain from faculty expertise.

A second faculty issue which has a noticeable impact on college flexibility is that of staff development. If courses and programs are to remain relevant, faculty must be provided with ongoing opportunities to update themselves. Liaison with the working world for which they are preparing students must be fostered through refresher programs, annual on-site experience, and membership in professional associations. Job descriptions should indicate the specific skills and knowledge required for both evaluative purposes and careful hiring practices. Finally, instructional development facilities must be provided if delivery systems are to evolve.

d. Facilities and Services

Changing student needs will be reflected in changing patterns of use of college facilities and services. The part-time or distant population may not require the addition of more space but rather the maximization of already existing space and the reorganization of existing services.

Classes beamed by satellite may use very little space but require extensive telephone hook-ups. Individual learning packages are also space-conserving but require both adequate hardware and sufficient accessibility. The increasing use of facilities in recipient communities places colleges in a new "tenant" position and policies must be developed to protect both parties. The concept of field branches should be explored.

Services such as counselling and learning centers must develop new flexibility in the face of changing student needs. Traditional institutions like students' associations will find their roles changing. Policies must provide the means of monitoring student needs if appropriate services are to evolve.

e. Scheduling and Admissions

In addition to the revised use of facilities and services is the revised use of time. Late afternoons, late evenings, and weekends are frequently ignored as potential instructional time and spring and summer months find most classrooms empty. The traditional semester or trimester system is not appropriate for employed students who may, however, be available for short, intensive periods. The creative use of instructional time can have a profound effect on college enrolment patterns.

Admission policies must be reexamined in the light of a changing student body. The influx of workers will bring varied school records plus life experience. New forms of assessment must be developed. Language training facilities should be upgraded. A growing senior citizen contingent will need special handling. How will out-of-province applicants be treated compared to Alberta graduates? Will quota systems, raised standards, or residency requirements be used to restrict the flow, or will colleges adapt to larger part-time, smaller full-time student bodies? How can upgrading be treated so that it is effective but of short duration? How frequently can programs admit new students—once a year? every month? any time? These and many other practical problems will have to be resolved if colleges are to respond flexibly to demographic change.

f. Liaison with Other Institutions

It seems clear that there are too many pressing decisions to be made for each college to tackle them all. The time and cost involved in instituting the changes which environmental forces require will necessitate sharing among institutions as never before experienced. Fortunately a number of provincial bodies, such as the Council of College Presidents, already exists, although some are not as active. These bodies can provide forums for exploring mutual problems and sharing tasks.

The first step is a shared knowledge of environmental demands. Then present institutional capabilities must be assessed. Then a set of provincial goals for the provision of responsive educational services must be established along with a timeline for their attainment. At this point the tasks can be parcelled out to the various constituents. For example, the Deans of Instruction might be asked to examine the problem of program jurisdiction and develop a tentative province-wide plan for development. Or a college with more experience in distance education than others might be asked to create a series of guidelines for the preparation of a course to be taught by satellite. Or a group of colleges which had participated in a successful consortia scheme might be asked to formulate a list of steps outlining the process. Or Registrars might be asked to prepare some alternative approaches to the semester-trimester system. And so on. Only through a concerted provincial effort can the required changes be accomplished in the time allowed.

The colleges must also look beyond their own system to benefit from the experience of other postsecondary institutions such as the technical institutes, vocational centers, and universities, as well as other organizations such as ACCESS.

The role of Alberta Advanced Education and Manpower cannot be overemphasized in this great provincial challenge. Funding for cooperative projects must be increased while delays in approval are minimized. Revision of facilities and services can be encouraged. The most recent demographic data can be disseminated. But most important, the department's vision of a diverse yet unified postsecondary system must be expanded while recognizing the importance of college-initiated projects such as those suggested here in achieving that end. If government is prepared to facilitate the colleges' response to environmental change through the appropriate allocation of resources, the dissemination of adequate information, and coordinated program guidance, then the colleges should be able to meet the test of the eighties.

Demands for Accountability will be experienced in a number of sectors of the colleges. These include:

a. Planning

Many respondents called for the use of inventive, future-oriented forms of planning such as were referred to in Chapter 3. The major aspect of these types of planning which has yet to be grasped by the colleges is that of the pro-active rather than reactive stance. The wait-and-see method has dominated college planning activities in the past. But in safety also lies lost opportunity. In the turbulent environment in which we find ourselves, one can wait forever and never see clearly. Therefore a more aggressive approach is advisable. A continued commitment to environment-watching plus an on-going long-term planning function at each college providing alternative futures to choose from will ensure a closer knit between environmental demands and college services.

It is at this point of contact where demands and services mesh that the impact of accountability will be experienced. There are enough other educational opportunities available that if the colleges do not provide what is needed, the potential student population will simply go elsewhere. Cries of budgetary restrictions will not be heard favourably by either government or the public if colleges are viewed as not living up to their mandate.

b. Funding

While government funding will continue to be a given for Alberta's community colleges, respondents seemed certain that total dependence on this funding source will not be satisfactory either in terms of college autonomy or in terms of projected activities. Searching for alternative sources of revenue is likely to become a full-time occupation in the colleges within the next few years.

A likely source of funds lies in industry. Here, accountability will be uppermost in any service agreement. Without the protection of bureaucratic structures to cushion response, colleges may learn for the first time what accountability really means. Survival in this atmosphere will require a new set of administrative skills; specifically, rapid decision making, quick turnaround on program delivery, enhanced communication abilities, and critical self-evaluation.

A source of funds that already lies within the grasp of the colleges is that of the college budget itself. A reordering of priorities and a fresh look at accepted practices may realign allocations. Accountability here becomes a form of self-examination, with a tough look at the question, "Are we getting the best value for each dollar budgeted?"

c. Liaison with Industry

Having established the need for close ties with industry, the task becomes how best to achieve this end. One way is by co-opting the environment into the organization, or to put it another way, involving influential representatives of industry in college policy decisions by making them members of such decision-making bodies as boards and advisory committees. Here again, accountability is essential. The information and advice provided by industry must be seen to be acted upon or involvement will be considered futile.

Another, and perhaps more effective, way to develop links with industry is to involve college members in joint projects such as work-study programs and on-site training. The more physical crossing of boundaries which occurs, the more mutual understanding will be generated.

d. Liaison with Government

As the major portion of the college dollar will continue to come from government, good communication between Alberta Advanced Education and Manpower and the colleges is essential. An interesting byproduct of this study was the discovery that college presidents and senior government officials saw eye-to-eye on all issues but one. That environmental force was Government Priorities among All Sectors which college presidents believed would have a significant effect on funding allocations to postsecondary education, while government officials viewed it as a less significant factor. In all other areas, the two groups saw environmental forces and their impacts on the colleges in a similar fashion.

Therefore, one might ask the question, why is it that the impression exists that communication between government and the colleges is less than satisfactory? A possible explanation may be that weak links occur within each group rather than between the two groups. For example, college members presenting a proposal to government for funds may not be adequately briefed regarding the best methods of presentation, where current funding priorities lie, or how to provide alternatives for a decision. On the other hand, members within the various government branches may not have sufficient information about a specific college's overall funding situation, program capabilities, or local needs.

Accountability works both ways. Not only should colleges be held accountable for their use of government funds, but government must be held accountable for the best possible distribution of those funds. In both cases, knowledge must be shared freely both within and across boundaries.

e. Effectiveness/Efficiency

It must now be clear that the colleges will be held accountable in several quarters for the provision of appropriate services in an economical manner. To achieve college goals effectively, the goals must be both clear and relevant to both the colleges and those they serve. To achieve college goals efficiently, resources must be maximized and used in a creative fashion acceptable to college members as well as college critics. To seek either effectiveness or efficiency alone would be futile. Both must be sought together as colleges strive towards a position of responsive accountability.

f. Liaison with the Public

It seems obvious that institutions whose sole aim is to serve the public should have close ties with that public. Yet how many colleges have public relations officers as opposed to information officers? Information only flows outward, public relations goes both ways. Until the communication function within the colleges becomes two-way, mistaken impressions will flourish on both sides. In order to be accountable to the public, the colleges must provide that public with a medium to allow their wishes to be heard.

In summary, colleges will experience many demands in the next decade. However, it appears that flexibility will be the key to survival. Flexibility of programming and delivery systems, and in faculty affairs and facilities and services will determine the success with which colleges handle environmental change. In addition, however, demands will be made for the colleges to be accountable for far-sighted planning, for efficient use of funds, and for establishing effective two-way communication links with government and industry.

3. The Environmental Perspective of Alberta Community College Presidents and Alberta Advanced Education and Manpower Officials

The first two sub-problems addressed by this study related to the degree of similarity between the views of the two sub-panels, the Alberta community college presidents and the Advanced Education and Manpower officials, in the identification of major environmental forces and the amount of influence these forces would have on policy development. This study has demonstrated that the viewpoint of both groups is essentially the same. The only item of significant difference between the two sub-panels in Round II, Government Priorities among All Sectors, disappeared in Round III when considered in relation to Technological Training and Retraining. It is apparent to both groups that this is an area of major concern for the government and therefore that funds are likely to be available for related development.

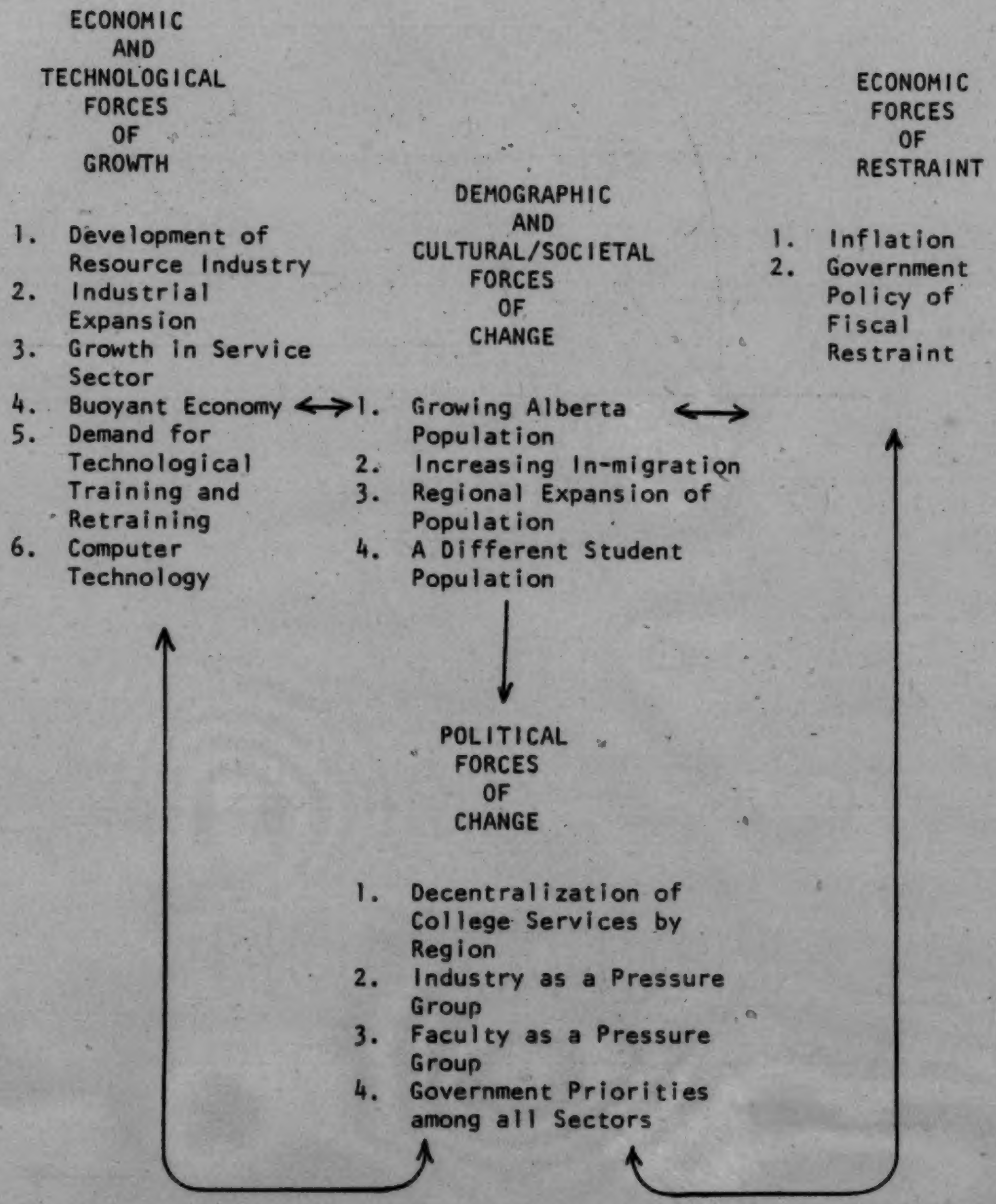
In Round III another item of significant difference arose over the degree of influence A Growing Alberta Population would have on Technological Training and Retraining. College presidents believed this force more influential than did government officials. The difference in perspective may be related to geographic location; the presidents are dispersed among the various regions of the province and may view regional growth more immediately than do the government officials centrally located in an already-busy city. Whatever the cause of the disagreement, the identification of only one item of significant difference in each of the two last rounds of the study indicates that the two sub-panels share a similar environmental perspective.

Environmental Theory

1. The Interactive Nature of Environmental Forces

The theory of causal texture of the environment posited by Emery and Trist (1969) is affirmed by the findings of this study. The change in rank order of forces from Round II to Round III indicated that respondents viewed environmental forces as interactive and shifting in nature. The useful construct of Hall's Typology (1972) enabled analysis of a complex topic into identifiable components. Economic Forces and to a lesser extent Political and Demographic Forces were perceived by panelists as the most important general environmental forces and the most influential in relation to the specific policy area of Technological Training and Retraining. Technological and Cultural/Societal Forces were viewed as having some influence, while Legislative and Ecological Forces were deemed irrelevant.

In an attempt to combine the concept of causal texture with the typology of environmental forces as determined by the findings of this study, a model of the Interactive Nature of Environmental Forces in Alberta, 1980-1990 is advanced (consult Figure 1). It can be seen from this model that Economic Forces are providing both growth and restraint factors in the environment which accounts for some of the ambiguity evident in environmental perceptions.



ECONOMIC AND TECHNOLOGICAL FORCES OF GROWTH

1. Development of Resource Industry
2. Industrial Expansion
3. Growth in Service Sector
4. Buoyant Economy
5. Demand for Technological Training and Retraining
6. Computer Technology

DEMOGRAPHIC AND CULTURAL/SOCIETAL FORCES OF CHANGE

1. Growing Alberta Population
2. Increasing In-migration
3. Regional Expansion of Population
4. A Different Student Population

ECONOMIC FORCES OF RESTRAINT

1. Inflation
2. Government Policy of Fiscal Restraint

POLITICAL FORCES OF CHANGE

1. Decentralization of College Services by Region
2. Industry as a Pressure Group
3. Faculty as a Pressure Group
4. Government Priorities among all Sectors

Figure 1

The Interactive Nature of Major Environmental Forces in Alberta, 1980-1990

The shifting, interactive nature of the environment is also supported by events which have occurred during the eight-month course of this study. Recent changes in federal-provincial relations and an expected slow-down of resource industry development may result in different panelist responses, were the study to begin again. At best, the results of the study represent a frozen moment in time. However, it is hoped that while individual components of the environmental picture described here may rise and fall in terms of significance, nevertheless the overall impression may prove to have longer-term validity.

2. Resource Dependence and Loss of Autonomy

The contention by Van de Ven (1976) that the need to acquire scarce resources results in the loss of some institutional autonomy appears to be supported by the findings of this study. The review of recent history of postsecondary education in Alberta provided in Chapter III revealed that local fiscal autonomy had yielded to centralized control. In addition autonomy regarding program determination had been mitigated by the institution of a government policy of coordination and avoidance of unnecessary duplication of services.

Despite the fact that these events occurred a number of years ago, a lingering sense of loss of autonomy remains as is evidenced by a number of respondents' comments:

- Respond to meet training needs in areas of service favoured by government.
- Restraint appears to be selective in respect to technological training priorities.
- For the colleges, apart from lobbying, not much can be done.

In addition, the disagreement which surfaced over the force Government Priorities among All Sectors indicated that presidents believed that this force played a greater role in the allocation of funds than did government officials.

3. Resource Dependence and Interorganizational Relationships

Van de Ven's suggestion (1976) that the need to acquire resources would also lead to involvement in interorganizational relationships also appears to be borne out by the findings of this study. Liaison with industry was frequently mentioned as a Possible College Adjustment. Not only would such interorganizational relationships result in more responsive programming, but cost-sharing seemed to be a major motivational factor. Liaison with other institutions was suggested many times but more to share costs than to facilitate program delivery. Respondents suggested that colleges improve their liaison with government not only to have access to better data but also to monitor government attitudes in order to facilitate better fund acquisition.

Methodology

1. The Delphi Method

The third sub-problem addressed by this study was to determine if the Delphi was a useful research method for analyzing a complex issue such as this. In several ways the Delphi method proved itself an appropriate tool for policy analysis. It provided a non-threatening environment in which to explore complex policy issues. It allowed a thorough means of eliciting informal judgements on a particular topic unlikely to be handled in such depth in a meeting format. It used the time of geographically dispersed panelists efficiently. The major limitation of the Delphi method in its present format is that it is physically unwieldy. A lot of time was taken up by late responses and losses in the mail. The data generated were of enormous bulk and the collation of information was a lengthy process.

It would seem that the future of the Delphi lies in the realm of computer systems such as the Electronic Information Exchange System developed at the New Jersey Institute of Technology. As computers become more adept at verbal content analysis, the feasibility of computer conferencing will be enhanced. Another use of the Delphi will be as a supporting methodology for other, more specific analysis techniques. In this capacity it should be viewed as an important link in an ever-developing chain of methodological approaches.

IMPLICATIONS

On the basis of research findings and conclusions drawn, several possible implications are considered. First of all, some attempts will be made to apply the technique of inventive planning through the presentation of five scenarios. Then some meta-policy propositions will be advanced for the consideration of postsecondary planners and policy makers, along with some specific suggestions for action. Finally some implications for further research will be suggested.

Inventive Planning Applied—Five Scenarios

A basic premise of this study has been the need for colleges to attempt inventive planning directions. To illustrate this point, a number of short scenarios have been developed showing a variety of possible college responses to the impact of environmental forces.

Scenario I. The Status Quo, Continued

Industries which have approached the colleges find a willingness to help but a lack of know-how when it comes to mounting the required short-term courses in the time allotted. The red tape involved in acquiring funding slows the process to the point where programs which are finally operationalized are also on the verge of becoming obsolete. New delivery systems remain in experimental stages and problems such as shortages of computer time and lack of sufficient satellite receiving dishes hamper widespread application. In addition, industry finds itself bargaining with competing colleges for the programs desired. The administrative complexities of dealing with more than one college are considered a waste of time. More and more, many industries turn to efficient and responsive commercial training companies which are springing up to fill the need, while others simply take on the training function themselves, after luring good instructors away from the colleges. Faced with failure, the colleges tend to retreat to a stock set of course offerings in the humanities, arts, and leisure areas.

Scenario II. A Turn Inward

Aware of the many changes likely to occur within the decade, some colleges undergo a process of self-examination, questioning the appropriateness of traditionally accepted practices. Extensive studies are conducted in such areas as delivery systems, admissions and scheduling, and facilities and services. Some excellent solutions are developed but the process of participatory decision making at the college level, involving committee work, questionnaires, research reports, and policy revision, has taken the better part of three years to complete. Having finally achieved a satisfactory level of internal flexibility, these colleges turn outward to discover that Alberta's postsecondary training needs are being met, if haphazardly, by less well-prepared but responsive colleges and by commercial training ventures.

Scenario III. Sharing the Workload

A more effective approach to the revision of traditional practices is brought about through cooperative efforts at the provincial level. The Council of College Presidents, having appreciated the potential of joint problem solving, conducts a series of workshops to identify common problems and assign task forces to resolve them. Progress is carefully monitored and acceptable solutions adopted on a provincial basis. At the same time the issue of program jurisdiction is tackled jointly by the Council and Alberta Advanced Education and Manpower. A policy of program specialization is hammered out. As each college's role becomes more specific, competition diminishes and information flows easily between institutions. The process of joint problem solving at a provincial level leads to cooperative programming and consortia arrangements which tend to be successful due to a heightened understanding of the situation at each college.

Scenario IV. Faculty Erupts

In their effort to be responsive to the needs of industry and the public, one of the colleges has tended to ignore or downplay the stresses being experienced by its own faculty members as they face a changing world. General hiring practices over the past several years have favoured the selection of part-time faculty and full-time positions have remained unfilled. In addition, program expansion during unpopular hours and seasons as well as at locations distant from college campuses has helped to swell the number of part-time faculty members to the position of a clear majority. Disparities in workload, benefits and salaries rankle. Contract negotiations are conducted by an overly-large representation of full-time faculty. Administration views their demands as inflexible and short-sighted. At a faculty meeting, largely attended by full-time members, a strike vote is passed. However, to their amazement, part-time faculty break rank and continue to work. But all the program and delivery system innovations being developed by full-time faculty grind to a halt. Administrators are in a quandry. Should they move to a complete, less expensive part-time faculty contingent, lose the impetus already gained in innovative projects, and face court action from the faculty association? Should they attempt to appease full-time faculty with the knowledge that the resulting contract will cripple the college financially and logistically as flexibility is sacrificed?

Scenario V. A Modularized Contract

Viewing the serious ramifications of having two distinct faculty populations, college administrators sit down with the provincial faculty association to identify pressing faculty needs. Both full- and part-time members are polled. At the same time, the major goal of the provincial college system is clearly outlined: Survival depends on the colleges' ability to maximize the flexibility of their services in order to be accountable to environmental demands for change. An understanding of the needs of both sides leads to a conciliatory atmosphere for bargaining. The result is a modularized contract on a provincial basis. Benefits are attached to instructional hours, and college-related activities other than teaching are also compensated, thus drawing the expertise of part-time faculty into such areas as committee work and innovative projects. In fact, the concepts of full- and part-time are made obsolete by the new modularized approach whereby each faculty member is compensated according to his own productivity. The colleges find that they save money through provincial bargaining and provincial benefit schemes and faculty members are pleased with increased recognition and the removal of inequalities.

One could go on constructing scenarios indefinitely, juggling the combination of environmental forces and their impacts. The point is that trends and events can be integrated in a manner such as this to highlight possible results. Negative factors thus identified can be avoided by interventionist tactics. Positive factors can be enhanced by seeking them out and facilitating their occurrence. Thus an aggressive long-term planning function can assist decision makers in formulating policies which demonstrate foresight and innovation.

Some Meta-policy Propositions and Specific Suggestions for Action

The third problem addressed by this study was the derivation of some meta-policy considerations or propositions from the date generated by a search for environmental forces and their impact on future college policy decisions. These over-riding guidelines are advanced to be considered by planners and policy makers in future policy development. The following propositions, along with their more specific suggestions for action, are intended to spark discussion. They are divided into two sections: Policy Implications Resulting from Demands for Flexibility, and Policy Implications Resulting from Demands for Accountability.

Policy Implications Resulting from Demands for Flexibility

Proposition 1: Programming

Develop methods of assessing industry's needs for training and retraining and of meeting these demands quickly and effectively.

Specific Suggestions:

(a) Assess requirements in industry and develop innovative courses and programs to provide training and retraining in marketable skills.

(b) Develop the capability to provide more extensive, short-term upgrading and retraining courses and programs.

(c) Phase out programs and services in low demand.

(d) Organize program structure for easy addition and deletion of courses.

(e) Reexamine mission statement in the light of training needs and restrict area of specialty.

(f) Provide opportunities for upgrading faculty.

(g) Question the concept of "program."

(h) Maintain a healthy balance between liberal and fine arts and career and trades programs.

(i) Review demand for information processing personnel and develop appropriate computer-related programs.

(j) Develop service courses to increase computer literacy in all students.

Proposition 2: Delivery Systems

Develop and utilize innovative and cost-effective delivery systems which reflect the needs of part-time, frequently off-campus students.

Specific Suggestions:

(a) Develop popular courses into modularized packages which can be used for individualized instruction.

(b) Provide instructional development opportunities for faculty.

(c) Create incentives for course revision.

(d) Adapt program delivery to part-time study.

(e) Devise cost-effective, less labour-intensive delivery systems and maintain cost-benefit analysis of them.

(f) Assess and utilize computer technology in the instructional process both on and off campus.

(g) Develop innovative means for program delivery off campus.

(h) Participate in consortia delivery systems.

(i) Obtain adequate start-up funds for innovative projects in delivery techniques.

Proposition 3: Faculty Affairs

Ensure faculty relevance through the development of appropriate selection procedures, the provision of adequate retraining opportunities, and the negotiation of flexible contracts.

Specific Suggestions:

(a) Consider the needs of both part- and full-time faculty in contract negotiations.

(b) Ensure mutual understanding by sharing all available information.

(c) Ensure faculty relevance through retraining.

(d) Secure staff with specialized skills.

(e) Ensure integration of liberal arts and trades instructors.

Proposition 4: Facilities and Services

Maximize present facilities and services by increasing flexibility and expand through decentralization where demand warrants it.

Specific Suggestions:

(a) Reexamine current facilities and services to see how they can be reorganized to meet the needs of an adult, part-time student population.

(b) Upgrade current facilities to adapt to new delivery systems.

(c) Expand facilities regionally; make use of local facilities; explore the ramifications of being a tenant.

(d) Expand and develop counselling and student service operations and learning centers.

(e) Encourage Students' Associations to become more relevant.

Proposition 5: Scheduling and Admissions

Schedule instructional time more efficiently and revise admissions policies to accommodate the new student population.

Specific Suggestions:

(a) Consider an extended day and year to accommodate increased numbers and maximize capital investment.

(b) Question the current semester-trimester system.

(c) Experiment with intensive short courses.

(d) Develop additional program intakes.

(e) Develop ways to place students appropriately.

(f) Determine treatment of out-of-province students as well as Alberta graduates.

Proposition 6: Liaison with Other Institutions

Find solutions to shared problems through a joint problem solving approach.

Specific Suggestions:

(a) Encourage cooperative projects among the colleges to solve joint problems.

(b) Draw on the expertise of NAIT, SAIT, the Vocational Centers, and ACCESS.

(c) Make arrangements with other institutions to share costs, the use of facilities, programs, etc.

Policy Implications Resulting from Demands for Accountability

Proposition 7: Planning

Develop and maintain a planning component committeed to the collection and analysis of current data and also to integrated, innovative long-term planning.

Specific Suggestions:

(a) Use inventive, future-oriented planning to maintain an appropriate volume of services and to cope with change.

(b) Attempt to foresee environmental trends and take preparative action.

(c) Assess requirements of the new student population by both obtaining demographic data and interacting with students to understand their needs.

Proposition 8: Funding

Develop facilities capable of generating alternative sources of revenue and review present allocations.

Specific Suggestions:

(a) Generate alternate sources of revenue by challenging industry to assist with resources such as funds, space, and equipment.

(b) Devise means of program delivery which generate profit.

(c) Review traditional fund allocations with the criteria of effectiveness and efficiency.

(d) Develop collective bargaining skills, learn to deal with the union mentality, and accommodate faculty demands where possible.

Proposition 9: Liaison with Industry

Develop the cooperation and encourage the support of industry through the involvement of industry representatives in college affairs.

Specific Suggestions:

(a) Enhance liaison with industry to develop mutual understanding.

(b) Monitor industry's requirements and training capabilities.

(c) Get more industry and business representatives on advisory committees and boards of governors.

(d) Engage in joint educational programming such as work-study programs and on-site training.

Proposition 10: Liaison with Government

Develop lobby skills and accommodation strategies and share program plans.

Specific Suggestions:

(a) Facilitate program specialization and jurisdictional issues through discussions of provincial needs.

(b) Develop lobbying skills and accommodation strategies; present alternate proposals if priorities differ.

(c) Work with government to obtain accurate regional demographic data and manpower requirements.

Proposition 11: Effectiveness/Efficiency

Ensure that college goals are relevant and are achieved through a maximization of resources available.

Specific Suggestions:

(a) Review college mission statements to assess relevance.

(b) Avoid duplication with other colleges if services are conducive to alternative delivery systems.

(c) Revise faculty contracts to reflect current college needs.

(d) Reallocate resources carefully, maximizing capital assets usage, transferring government support to operating needs, and increasing short-run strategies.

Proposition 12: Liaison with the Public

Develop a two-way flow of information with the public.

Specific Suggestions:

(a) Incorporate public relations tactics within information offices.

(b) Provide a medium for the public to use to articulate their needs and expectations.

(c) Enhance college image to increase credibility.

(d) Develop new approaches to accountability.

Implications for Further Research

The field of organizations and their environments is rich indeed. It is likely that the developing body of theory on this topic will continue to expand as long as environments are turbulent and organizational survival rests on accurate interpretations of them.

The writer anticipates that current resource-dependent theories will eventually give way to theories incorporating a broader environmental context, perhaps including political, technological, and social aspects as well as economic ones.

At the present time, however, and as a result of the research and findings of this study, two topics for further research appear particularly pressing: Environmental Control and Inventive Planning.

1. Environmental Control

Research is needed into the strategies employed by organizations to control their environments. Theories proposed by Thompson and McEwen (1958), Thompson (1967) and Pfeffer and Salancik (1978) have suggested ways of developing organizational control over environmental uncertainty. However, apart from studies conducted by Kimberley (1975) and Hirsch (1975), little work has been done in the analysis of actual coping and controlling mechanisms. The postsecondary field would provide a valuable canvas if appropriate research tools could be developed. The barriers of hostility and secrecy could be surmounted if institutions perceived that a shared dependency could be ameliorated through the exchange of information.

2. Inventive Planning

Zeigler's (1970) suggestion that educational institutions involve themselves in inventive planning activities remains largely unachieved (Berghofer, 1980). Research should be conducted to determine what kinds of inventive planning, if any, are now being conducted in postsecondary institutions across the country. A series of practical steps involved in the inventive planning process should be developed for admnistrators to follow. There seems to be agreement about the value in this type of planning, but confusion exists over how to set about accomplishing it.

SUMMARY

This final chapter provided a summary of the study, conclusions to be drawn from the research findings, and implications resulting from these findings and conclusions.

The summary of the study reviewed the purpose and problems of the study, its focus and justification. The conceptual and methodological frameworks of the study were described. The study's respondent groups were identified and the instrument development, data collection, and data treatment procedures reviewed. Finally the results of the research were summarized into seven major findings: (1) Identification of Environmental Forces; (2) Identification of Major Environmental Forces; (3) Projected Impact of the Major Environmental Forces on the Colleges; (4) Projected Impact Areas of the Colleges to Experience Environmental Change; (5) Identification of Highly Significant and Significant Impact Areas; (6) Identification of Major Influential Forces on Technological Training and Retraining; and (7) Analysis of Sub-panel Differences.

General conclusions drawn from the study centered around three topics: the postsecondary setting, environmental theory, and the Delphi method. Conclusions regarding the postsecondary setting were divided into three areas. The general environment in the next decade was described by means of a scenario and an analysis of thirteen aspects of the changing postsecondary environment in Alberta; the impact of environmental forces on college policy development was outlined and twelve areas of the colleges were explored for the impact of demands for flexibility and accountability on them; and the environmental perspectives of community college presidents and Alberta Advanced Education and Manpower officials were compared. Three conclusions were drawn relating to environmental theory. The interactive nature of forces in the environment was discussed and a model for The Interactive Nature of Environmental Forces in Alberta, 1980-1990 was advanced. Resource dependence and the loss of institutional autonomy were considered in the light of the findings of this study as were resource dependence and interorganizational relationships. The utility of the Delphi method as employed in this study was discussed, features and limitations outlined, and future applications suggested.

The final section of the chapter proposed some implications based on the research findings and conclusions. A series of five scenarios was advanced in an attempt to apply the principles of inventive planning. Then twelve meta-policy propositions along with specific suggestions for action were suggested for the consideration of planners and policy-makers. Finally some implications for further research were suggested in the areas of environmental control and inventive planning.

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APPENDIX 1

PACKAGE OF MATERIALS, ROUND I

May 30, 1980

Thank you for agreeing to participate in this study of environmental forces influencing Alberta community colleges in the next decade. I hope not only to identify the major forces and to anticipate their impact on the colleges, but also to determine the implications for policy making.

You have been selected along with a number of other experts in the Alberta postsecondary system to form the panel for this study. Be assured that your responses will be treated confidentially at all times. Each sheet of the questionnaires sent to you will be coded with your own identification number to ensure accuracy of compilation. One of the advantages of this type of study is that ideas can be shared freely and arguments probed while maintaining an atmosphere of anonymity.

The study will consist of four major rounds of questionnaires which will be circulated at intervals between now and November, each building on the information gained from the previous round. Between rounds you may be contacted individually for clarification, additional input, or further consideration. For more information on the Delphi technique employed in this study, consult the green handout in your package of materials.

At the conclusion of the study you will receive a summary document which should provide useful input for planning and policy making in the next decade. A follow-up workshop is also envisaged. In addition, data collected in the study will be reported in the thesis I am writing in partial fulfilment of my doctoral degree in educational administration. Again, information will be treated in a confidential fashion.

Please complete and return the Personal Data Sheet and a typed copy of the Round I questionnaire (the working copy is for your files). A self-addressed envelope is enclosed for your convenience.

As preparation of the Round II questionnaire cannot be started until all of the Round I questionnaires are returned, please adhere to the deadline of June 13, 1980.

As the questions require some reflection, give yourself ample time to respond. If you want to discuss the questionnaire, please call me at 432-3094 (days) or 436-5728 (evenings).

Cordially

Gail V. Barrington
Doctoral Candidate

WHAT IS A POLICY DELPHI STUDY?

A policy Delphi is not a quickie questionnaire or a polling device. It is not a substitute for quantitative studies, committee work, or decision making. It is, however, a free-form structure to facilitate the exchange of ideas, to encourage in-depth thinking, and to provide an anonymous forum to explore alternatives about a specific policy area. A hand-picked panel of experts pursues a topic through a series of iterative rounds until a clear indication of the group's opinions and attitudes emerges and some discussion has taken place on the policy options presented.

The general characteristics of a policy Delphi usually include:

1. Formulating the issues
2. Exposing the options
3. Determining initial positions on the issues
4. Exploring reasons for disagreement
5. Reevaluating positions
6. Pursuing implications

When consensus is obtained on an issue, it is dropped from further exploration and reappears only in the summary document. When polarization of views occurs, the study monitor can design questions to probe differences.

A panel member has certain rights:

1. You may choose not to answer a question if you feel your judgement is risky.
2. You may restate a question and answer that one if you feel that the original is misleading.
3. You may consult with information sources normally available to you to respond to particular questions so long as your response remains that of an individual rather than a spokesman.
4. You may express short arguments or comments on any judgement about which you feel confident.
5. You may comment on questionnaire design and make suggestions for change.
6. You may question the summary of responses if you feel that the interpretation is incorrect.
7. You may call the study monitor for clarification of your task.

An example of a series of questionnaires for a policy Delphi on establishing goals for a specific college program might look something like this:

ROUND I

An open-ended questionnaire would be circulated to participants asking questions such as the following:

As a result of experiences provided by Alpha College, graduates from Program X should:

a) Know:

b) Be able to:

c) Feel:

etc. . . .

About six weeks later when the data had been compiled into the categories which emerged from the responses, the Round II questionnaire would be created, based on this data. Respondents would then be asked to rate the importance of the data collected in a manner such as the following:

ROUND II

As a result of experiences provided by Alpha College, graduates from Program X should:

a) Know:

	Low Importance				High Importance
1. About the world in which they live.	1	2	3	4	5

If you select 4 or 5, give your argument in support of the imporance of this goal:

If you select 1 or 2, give your argument against the importance of this goal:

etc. . . .

After about a month, when the ratings had been compiled, the Round III questionnaire would be prepared showing both the majority selection and the individual's selection as well as arguments pro and con the importance of specific goals. Respondents would be asked to reconsider their responses in a manner such as the following:

ROUND III

For each item, your previously stated choice is circled while the choice most frequently selected by other participants is indicated by a triangle. In the light of arguments made by other respondents, reconsider each item. You may change your response if you wish.

As a result of experiences provided by Alpha College, graduates from Program X should:

	Low Importance				High Importance
a) Know: 1. About the world in which they live.	1	2	3	4	5

PROS:

- Should be prepared not only for career but for life.
- Should have broader knowledge in case of later career change.

CONS:

- Not enough time to cover program material let alone other subjects.

etc. . . .

Within a month, when the final priority goals had been identified, a further questionnaire would be developed pursuing these goals for policy implications such as the following:

ROUND IV

The following goals for Program X were selected as Quite Important or Very Important by a majority of respondents. Please indicate what policy implications this would have for Alpha College.

a) Knowledge:

1. Students would have a broader awareness of the world in which they live.

POLICY IMPLICATIONS:

etc. . . .

A final summary document on policy implications of recommended goals for Program X would then be developed and passed on to policy makers and program designers.

ENVIRONMENTAL FORCES AND COMMUNITY COLLEGES IN THE '80'S

PERSONAL DATA SHEET

NAME ______________________________

MAILING ADDRESS ______________________________

____

______________________________ POSTAL CODE __________

TELEPHONE NUMBER (days) __________ (evenings) __________

NAME OF ASSISTANT/SECRETARY ______________________________

PERIODS OF ABSENCE FROM YOUR OFFICE OF MORE THAN 5 CONSECUTIVE DAYS DURING THE PERIOD JUNE - DECEMBER, 1980: ______________________________

____

____

____

AGE ____________________ SEX ____________________

HIGHEST EDUCATIONAL QUALIFICATION ______________________________

Field of Specialization ______________________________

PRESENT POSITION IN POSTSECONDARY EDUCATION ______________________________

____

Length of Time in Position ______________________________

MOST RECENT PREVIOUS POSITION IN POSTSECONDARY EDUCATION __________

____

Location ______________________________

Length of Time in Position ______________________________

TOTAL NUMBER OF YEARS INVOLVED IN POSTSECONDARY EDUCATION __________

____

ENVIRONMENTAL FORCES AND COMMUNITY COLLEGES IN THE '80'S

ROUND I

IDENTIFICATION OF ENVIRONMENTAL FORCES

BACKGROUND:

The need for organizations to be responsive to the environment in which they operate has been stressed by many writers in recent years. Several categories of environmental forces have been identified, including:

1. TECHNOLOGY (e.g. technological advances; new methodologies)
2. LEGISLATION (e.g. federal and provincial laws; the legal system)
3. POLITICS (e.g. the political process; political conditions; pressure groups)
4. ECONOMICS (e.g. economic conditions)
5. DEMOGRAPHY (e.g. number of people; distribution)
6. ECOLOGY (e.g. social systems of organizations; physical environment)
7. CULTURE (e.g. norms; behaviours; values)

INSTRUCTIONS:

1. Consider the major categories of environmental forces.

   The questionnaire has been divided into the seven major categories referred to above simply to provide a framework for your reflections. Feel free to add further categories (#8 has been provided for this purpose and additional space can be found on page 9).

2. Identify influential forces within each category.

   Within each category, identify any environmental forces or factors which you consider are influential now or will become influential in the next decade in determining the future direction of Alberta's community colleges. Space has been provided for three responses but this is simply a guideline. You may wish to suggest fewer or more than three forces. If you run out of room or wish to append any general comments, please use page 9.

3. Support each selection with a reason.

   For each environmental force which you identify, please give your reason for the importance of your selection. An example is provided below:

EXAMPLE:

LEGISLATION

Legislative forces which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force: Creation of a federal department of advanced education.

Reason for Importance: Federal involvement will influence provincial policies in an attempt to achieve standardization across Canada.

DEADLINE:

As Round II cannot be designed until all the responses for Round I have been compiled, please adhere to the deadline of June 13, 1980.

1. TECHNOLOGY

Technological forces (such as technological advances, new methodologies, etc.) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

2. LEGISLATION

Legislative forces (such as federal and provincial laws; the legal system) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

3. POLITICS

Political forces (such as the political process, political conditions, or pressure groups) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

4

4. ECONOMICS

Economic forces (such as economic conditions) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

5. DEMOGRAPHY

Demographic forces (such as number of people, distribution, etc.) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

6. ECOLOGY

Ecological forces (such as the social systems in which organizations find themselves and their physical environment) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

7. CULTURE

Cultural forces (such as norms, behaviours, values) which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

8. ______________________ (Other)

______________________ forces which will be influential during the next decade in determining the future direction of Alberta's community colleges include:

(a) Force:

Reason for Importance:

(b) Force:

Reason for Importance:

(c) Force:

Reason for Importance:

Additional Comments:

Thank you for your contribution. Please return a typed copy of this questionnaire with the Personal Data Sheet in the envelope provided.

APPENDIX 2

PACKAGE OF MATERIALS, ROUND II

August 15, 1980

Here is your package of materials for Round II of the Delphi study "Environmental Forces and Community Colleges in the '80's" which I am conducting in partial fulfillment of my doctoral dissertation in Educational Administration.

The high quality of responses in Round I has resulted in a very challenging document for Round II. Your task this time is to rate the environmental forces identified in Round I for the likelihood of their occurrence in the next decade and the degree of impact they will have on the community college system in Alberta.

A word about the construction of the Round II questionnaire. When more than one participant made the same point in Round I, the answers were summarized into one statement. Otherwise, responses were generally quoted in an edited form. All general comments were quoted directly. Due to the inevitable overlap among the seven major forces cited in Round I, some of the responses were shifted to more appropriate categories strictly based on editorial opinion. The most movement occurred in the areas of Politics, Ecology, and Culture. Nearly all responses have been recorded in some fashion.

Although the new questionnaire looks bulky, it has been tested in the field as taking approximately thirty minutes to complete. It is suggested that it be completed in several sittings rather than all at once. Consult the instruction sheet in the questionnaire for complete details.

Please avoid the September rush by making sure you adhere to the deadline of August 29, 1980.

Thank you for your continued cooperation. I'm looking forward to your responses!

Yours truly

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ENVIRONMENTAL FORCES AND COMMUNITY COLLEGES IN THE '80'S

ROUND II

RATING OF ENVIRONMENTAL FORCES

INSTRUCTIONS FOR ROUND II

1. Detach the orange Rating Key from your questionnaire to consult while recording your answers.

2. Consider each environmental force and the reasons given for its importance. These reasons have been suggested by you and your colleagues and do not represent the only reasons for the force's importance, nor are they always the most important ones. However, at least one participant felt that each reason was a good argument in favour of the force's importance.

3. Rate each force for 1) Likelihood of Occurrence in the Next Decade, and 2) Degree of Impact on Alberta's Community College System. The four-point scale goes from 1 (Very Likely) (High Impact) to 4 (Very Unlikely) (No Impact). Consult the Rating Key for a more detailed interpretation of each score. Circle the answers of your choice. Space for further comments is provided.

4. It is suggested that you complete the questionnaire in three or four short sittings rather than all at one time. The questionnaire has been tested in the field as taking approximately thirty minutes to complete.

5. Please return your completed questionnaire in the self-addressed envelope provided no later than August 29, 1980. (An additional copy of the questionnaire is included in the package for your files.)

RATING KEY

1. LIKELIHOOD OF OCCURRENCE IN THE NEXT DECADE

	Scale Reference	Definitions
1	VERY LIKELY	Very likely to happen in the next decade Already under way
2	LIKELY	Likely to happen in the next decade
3	NOT LIKELY	Not likely to happen in the next decade
4	VERY UNLIKELY	Will not happen in the next decade An irrelevant item--should be dropped

2. DEGREE OF IMPACT ON ALBERTA'S COMMUNITY COLLEGE SYSTEM

	Scale of Reference	Definitions
1	HIGH IMPACT	Will have a major impact on the development of the college system Will have a direct bearing on changes made
2	MODERATE IMPACT	Will have some impact on the development of the college system Will have some bearing on changes made
3	LOW IMPACT	Will have little impact on the development of the college system Will have no direct bearing on changes made
4	NO IMPACT	Will not influence the development of the college system at all Has already had its impact on the system An irrelevant item--should be dropped

1. TECHNOLOGICAL FORCES	LIKELIHOOD	IMPACT
1. Force: Technological demand for Training and Retraining Reasons for Importance: Need to expand Alberta's capability to train skilled manpower Need to provide greater access to training in high demand occupational areas Increasing need to retrain people who become technologically displaced Need to maintain knowledge and skill levels of the labour force Need for colleges to be constantly aware of current and possible future changes in technology	1 2 3 4	1 2 3 4
2. Force: Development of new sources of energy Reasons for Importance: The development of alternative energy systems (such as solar, wind, thermal and nuclear power as well as an alternative to the internal combustion engine) will be demanded in the light of depleting natural resources. Professional scientists and engineers will have to be supplemented by armies of specialized technicians trained at 1 or 2 year levels who are provided with the necessary skills to cope	1 2 3 4	1 2 3 4
3. Force: Tar Sands Technology Reasons for Importance: Will bring more potential students to Alberta Need for technologies to be developed Will require extensive training by colleges and technical institutes Later requirements will exist for management and the arts	1 2 3 4	1 2 3 4
4. Force: Medical Technology Reason for Importance: Range of para-professionals and technologists will be required to complement medical doctors in areas of diagnostic, surgical treatment, and preventative techniques	1 2 3 4	1 2 3 4

1. TECHNOLOGICAL FORCES continued	LIKELIHOOD	IMPACT
5. Force: Computer Technology Reasons for Importance: Computer applications will become increasingly required in the basic educational background of business, scientific and management preparation programs as well as in secretarial sciences New job functions will be created; many existing jobs will be replaced by automation Demand for conventional programs such as Bookkeeping will decline	1 2 3 4	1 2 3 4
6. Force: The market rate for qualified instructors Reason for Importance: To obtain competent instructors, the colleges have to compete with the private sector in offering competetive compensation packages	1 2 3 4	1 2 3 4
7. Force: Satellite Communications Reasons for Importance: Increasing availability of equipment to capture satellite signals The potential for education in the home, on the job site, away from the traditional classroom will increase dramatically Program delivery to remote areas will be enhanced The question will be raised about the continuing need for any additional expensive campus institutions which may bring a swing from heavy capital investment to more operational dollars The role of instructors will change to that of designers and consultants Will require extensive coordination within institutions and at the system level to be cost effective	1 2 3 4	1 2 3 4

1. TECHNOLOGICAL FORCES continued	LIKELIHOOD	IMPACT
8. Force: Cable TV Reasons for Importance: Ability to reach new clients and remote areas Ability to advertise at modest rates; hence, increased enrollments Creative alternatives to face-to-face in-class presentation Useful in mass teaching	1 2 3 4	1 2 3 4
9. Force: Television Reason for Importance: New and eventually economical equipment will enable the consumer to adapt his TV set to use it for communication and instantaneous information retrieval	1 2 3 4	1 2 3 4
10. Force: Conference Telephone Reasons for Importance: Use by administration Use for discussion of seminar participants	1 2 3 4	1 2 3 4
11. Force: Fibre optics Reasons for Importance: Impact on instructional methodology Local vs. distance instruction	1 2 3 4	1 2 3 4
12. Force: Technological advances in teaching modes Reasons for Importance: Becoming viable at less cost More accessible to students Potential for far greater individualized instruction than has been possible before Impact on equipment and other capital and operating needs of colleges Increased flexibility in presentation of subject matter Need for new teaching technologies to ensure that instructors are capable of multi-methodology and multi-media applications Need for frequent modifications of methodologies to keep up with advances	1 2 3 4	1 2 3 4

1 TECHNOLOGICAL FORCES Continued	LIKELIHOOD	IMPACT 4
13. Force: Improved Data Storage and Retrieval Reasons for Importance: Instant and accurate record-keeping Ability to analyze data to better see the consequences of actions (i.e. accurate cost/benefit analysis) Ability to check enrollments and course offerings across the province Need for long range, predictive planning	1 2 3 4	1 2 3 4
14. Force: Word Processing Reason for Importance: New equipment will revolutionize and ease day-to-day office and business communication	1 2 3 4	1 2 3 4
15. Force: Advances in Learning Theory Reasons for Importance: Learning behaviour studies will direct teaching process into new arenas by developing the understanding of the chemistry of the brain College learning will be more satisfying to more students Faculty development will be required	1 2 3 4	1 2 3 4
16. Force: Increased utilization of natural renewable resources Reason for Importance: Utilization of natural renewable resources will change technology in building and mechanical services	1 2 3 4	1 2 3 4

Additional Comments

There are no technologies which are currently not known which will contribute to or influence postsecondary education in Alberta during the 1980's.

It is important to design the instructional mode so as not to lose the human element.

Most colleges are ill-equipped and ill-informed to make intelligent choices regarding computers.

Further Comments Re: Technological Forces:

2. LEGISLATIVE FORCES	LIKELIHOOD	IMPACT
1. Force: Revisions to the Colleges Act Reasons for Importance: Could affect the degree of local autonomy held by boards of governors Could change environment in which colleges operate Could affect ability of colleges to meet local needs	1 2 3 4	1 2 3 4
2. Force: Legislation assuring equal acces to postsecondary education for all Albertans Reason for Importance: Colleges will be required to divert resources and to develop a host of delivery systems for centers distinct from their central location	1 2 3 4	1 2 3 4
3. Force: Increased statutory rights for the disadvantaged Reasons for Importance: Groups such as natives, women, single parents and other disadvantaged groups will have their access to postsecondary institutions facilitated Will lead to expansion in both regular and non-traditional programs and services Present balance of human services to technologies will remain, meaning a rapid increase in human services to keep pace with technological growth Increased special training programs for the disadvantaged	1 2 3 4	1 2 3 4
4. Force: Changes in Human Rights Legislation Reasons for Importance: Colleges and individual staff members will become more accountable for what they say and do Will require extensive development of college calendars, procedures for student appeals, hiring processes, etc.	1 2 3 4	1 2 3 4

2. LEGISLATIVE FORCES Continued	LIKELIHOOD	IMPACT
5. Force: Constitutional Reform re: Treaty Indians Reasons for Importance: Responsibility for treaty Indians if passed to the province will allow equal treatment for all individuals As each band seeks to establish its own college, existing colleges will be asked to broaden their mandate and develop delivery systems to assist the native in meeting their aspirations Will combine with accelerated trends towards decentralization of government services to expand college programs and services	1 2 3 4	1 2 3 4
6. Force: Financial Administration Act or equivalent Reasons for Importance: Will demand cost effectiveness and greater financial accountability for educational expenditures Will stimulate initiative seeking access to non-traditional funds	1 2 3 4	1 2 3 4
7. Force: Increased Student Aid Reason for Importance: Real personal costs to students in terms of foregone earnings will require additional provincial aid if we are to maintain an assured level of professionally qualified and technically skilled manpower	1 2 3 4	1 2 3 4
8. Force: Professions and Occupations Legislation Reasons for Importance: Will bring changes in training requirements for many groups May result in mandatory participation in retraining and refresher programs	1 2 3 4	1 2 3 4

2. LEGISLATIVE FORCES Continued	LIKELIHOOD	IMPACT
9. Force: Changes in Apprenticeship Legislation Reason for Importance: Will allow more on-the-job training to alleviate some of the pressure on colleges to supply all the technical training	1 2 3 4	1 2 3 4
10. Force: Changes in Federal-Provincial agreements re: Postsecondary Education Reasons for Importance: Could have an effect on regional regulation and mandate for post-secondary education Could have an impact on funding for occupational training and bilinguism	1 2 3 4	1 2 3 4
11. Force: Legislation re: community use of institutional facilities Reasons for Importance: Stress between jurisdictions Perceived savings may not be realized	1 2 3 4	1 2 3 4
12. Force: Legislation re: copyright for both printed and visual materials Reason for Importance: Greater impact on individual producers of materials, publishers, and institutional ability to utilize products	1 2 3 4	1 2 3 4
13. Force: Creation of a foundation for research and innovation in education like the Alberta Heritage Medical Research Foundation Reason for Importance: Will provide stimulus for research and innovation in education designed to expedite change	1 2 3 4	1 2 3 4
14. Force: Legal permissability of private educational concerns Reason for Importance: If they prove to be more effective and efficient, the trend will be away from public educational institutions	1 2 3 4	1 2 3 4

2. LEGISLATIVE FORCES Continued	LIKELIHOOD	IMPACT
15. Force: Legislation to permit industry to fund release time for more educational opportunities for workers Reasons for Importance: Will expand the cycle of returnees to the educational system Will demand relevant materials Will enhance the number participating	1 2 3 4	1 2 3 4
16. Force: Legislation to provide a guaranteed income Reasons for Importance: Increased dependency of individuals and employers on government Increased government control of college programs	1 2 3 4	1 2 3 4
Further Comments Re: Legislative Forces:		

3. POLITICAL FORCES	LIKELIHOOD	IMPACT
1. Force: Increased political turbulence in the Third World Reasons for Importance: Growing pressures to admit immigrants on humanitarian grounds, with educational consequences Need for colleges to transmit an understanding about social and political inequities at a global level to local citizens Broader awareness of issues due to rapid communication	1 2 3 4	1 2 3 4
2. Force: Desire of third world nations for a higher level of postsecondary education Reasons for Importance: Increasing numbers of foreign students seeking entry into Canadian institutions The role of colleges in some technologies could be significantly enhanced	1 2 3 4	1 2 3 4
3. Force: Growth in awareness of Alberta's interdependence with the rest of the world Reason for Importance: A more cosmopolitan student clientele	1 2 3 4	1 2 3 4
4. Force: Direction of postsecondary education in the US and Ontario Reason for Importance Direction in Alberta tends to parallel these by 0 - 10 years	1 2 3 4	1 2 3 4
5. Force: Jurisdictional disputes over resources between federal and provincial governments Reason for Importance: If Alberta and Canada cannot agree on ownership and price for oil, the mega-projects slated for development could be jeopardized thus affecting manpower requirements	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
6. Force: Federal insistance that provinces pay a greater share of the cost of postsecondary education Reasons for Importance: Federal government will only provide funds when it matches the needs of one of their agents (e.g. C.I.E.A.) so that the province will have even tighter control over funding and program approval Program development and physical facilities in many provinces depend heavily on federal support	1 2 3 4	1 2 3 4
7. Force: Dissatisfaction with Confederation Reason for Importance: Overtones of independence in Alberta will maintain a stance of providing as much training here as possible	1 2 3 4	1 2 3 4
8. Force: Jurisdictional disputes over establishment of national standards for professions and trades Reason for Importance: Delays and confusion will result	1 2 3 4	1 2 3 4
9. Force: The Council of Provincial Ministers of Education Reason for Importance: Their influence on educational trends, including federal policies affecting education such as student financial support, use of satellites, and federal funding through the provincial governments	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
10. Force: Continuing dominance of the Progressive Conservatives Reasons for Importance: Their philosophy affects availability of education and how the cost is shared i.e. higher tuition, greater government support Their policies can mould the colleges to a considerable extent (e.g. manpower training) through resource allocation Continued policy of decentralization of services leading to growth (much of it artificial) in smaller rural colleges Necessity to appear less controlling while maintaining level of control commensurate with responsibility to the tax payer. This will put government controlled institutions under boards of governors while tying funding to ensure a more subtle form of control	1 2 3 4	1 2 3 4
11. Force: Government priorities among all sectors Reasons for Importance: Will limit public support for postsecondary education Will require greater accountability from the colleges Will force colleges to take initiative to find new ways of meeting financial needs Will determine growth rate of programs and regional expansion Areas of innovation may be supported by Heritage funds Dependence on government grants will occur at the expense of college autonomy	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
12. Force: Government priorities within the area of education Reasons for Importance: Limited dollars will cause a struggle for a "fair share" between colleges and universities, public and private institutions Strained relations will force the government to assess where to place funds Decreasing government support for general education, cultural and fine arts programs, lowering their occupational status	1 2 3 4	1 2 3 4
13. Force: Strained College-University Relations Reasons for Importance: Increased centralization of control of programs and admissions for transfer to universities due to declining enrollments Possibility of degree-granting status will have staffing and programming implications for both sectors	1 2 3 4	1 2 3 4
14. Force: Decentralization of Services by Region Reason for Importance: Will result in colleges attempting to provide the spectrum of post-secondary education while trying to be more responsive	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
15. Force: Faculty Reasons for Importance: Unionization and the attainment of legal status and rights will have an increasing impact on internal operations, making it increasingly difficult to reduce staff which is redundant or incompetent Influence due to sizable numbers in the provincial association Power developing through the collective bargaining process The pressure to find security Lack of flexibility due to rigid faculty contracts will impede the colleges because of fixed workloads and the high cost of instruction culminating in increased costs without increased productivity Negotiations will be more restricted and the trends to lower workloads and higher salaries will be moderated affecting colleges' ability to hire staff Who controls the educational process--management or academic staff? Litigation re: contract fulfillment--do fees provide the opportunity to participate or is there an implied right of a minimum level of achievement	1 2 3 4	1 2 3 4
16. Force: Boards of Governors Reasons for Importance: Educational needs and political policies may not be congruent Have the mandate for local control but must wrestle with the power they apparently possess and the power they really possess e.g. the difficulty in controlling a budget they do not establish	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
17. Force: Civil Servants Reasons for Importance: They have an immeasurable influence on the political and educational processes due to their closeness to and knowledge of politics and education and also due to their length of tenure as compared with politicians Administration is becoming politically oriented; decisions and recommendations are made on the basis of politics not needs Burgeoning bureaucracies make obtaining decisons increasingly difficult	1 2 3 4	1 2 3 4
18. Force: Taxpayers Reasons for Importance: Concern about increasing costs of education and the influence of such actions as Proposition 13 in California Demands upon the colleges to be "all things to all people" Public awareness of what is needed and the colleges' ability to deliver will bring forward acute analysis of the role of the colleges in the province, a constant demand for relevance, and a challenge to the need for "liberal education"	1 2 3 4	1 2 3 4
19. Force: Politicians Reasons for Importance: They are under pressure to promise that educational needs will be met and frequently expect the colleges to meet these needs without providing the necessary funds or facilities	1 2 3 4	1 2 3 4
20. Force: Labour Unions Reason for Importance: Will increase in importance as industrialization grows Will need and ask for more relevant training programs from the colleges for their membership and leadership	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
21. Force: Community Reasons for Importance: Community-based pressure will increase the emphasis on community services Government will have to increase funds for more credit courses in the area and not treat them as necessary evils Although the colleges are part of a system, they have a primary responsibility to the communities they serve. Community pressure can shape the planning direction of a college Smaller communities will demand better access to a wider range of postsecondary programs Demands for programs in safety and recreation	1 2 3 4	1 2 3 4
22. Force: Industry Reasons for Importance: Demahd for more skilled labour Forecast shortage in mid-level technical skills will lead to increased emphasis on vocational and technical education Inflexibility of apprenticeship training will be attacked and modified Seeking more say in subjects taught and methodologies Growth in size and amount of money paid for taxes and fees accompanied by desire for more say in direction of postsecondary education Demand for more industry-based training will lead to greater communication and cooperation between colleges and the private sector and will result in programs reflecting more precisely the demands of the labour market Emphasis on practical training will decrease role of universities and give colleges a larger slice of the postsecondary dollar Industry will influence government to respond to manpower demands Industry may offer assistance with capital, equipment, on-the-job training, etc.	1 2 3 4	1 2 3 4

3. POLITICAL FORCES Continued	LIKELIHOOD	IMPACT
23. Force: Native Groups Reasons for Importance: Drive by treaty Indians for greater control over their own destiny will lead to demands for colleges run by Indians and for greater access to the educational process Will lead to requests for aid in developing teachers, administrators, and courses	1 2 3 4	1 2 3 4
24. Force: New Canadians Reason for Importance: Will press for programs to help establish themselves in society	1 2 3 4	1 2 3 4
25. Force: Militant Groups Reason for Importance: Actions bordering on anarchy are certain to have a profound influence on political processes	1 2 3 4	1 2 3 4
Further Comments Re: Political Forces:		

4. ECONOMIC FORCES	LIKELIHOOD	IMPACT
1. Force: Government policy of fiscal restraint Reasons for Importance: Colleges will continue to be under pressure to increase efficiency and productivity Will limit rate of growth and availability of capital and operational dollars Affects priorities that can be met Continuation of staff and service cuts Excessive dependence on government grants will threaten college autonomy As colleges move toward a business model, more time will be required for fund raising. This will lead to a different set of management responsibilities and fiscal policies at all college levels With the end of the era of huge transfers of public money to institutions, massive infusions of money will be made in the name of Catch-up or Start-up grounds. These will be for politically motivated activities such as safety, industry, and scientific research	1 2 3 4	1 2 3 4
2. Force: Inflation. Reasons for Importance: Colleges will have to economize and allocate their limited funds in the most effective and efficient manner Budget increases consistantly less than the rate of inflation cause difficult decision making by boards and administrators regarding reduction in services, programs and staff Curbs to off-set inflation may lead to higher employment and a return to postsecondary education of some form Higher cost of education; greater loss of potential earning; need to maintain standard of living accustomed to	1 2 3 4	1 2 3 4
3. Force: Buoyant Economy Reasons for Importance: Strong employment market Students may enter workforce directly from high school Lower enrollment in full time students but marked increase in part time Increased demands by students wishing to study during non-traditional periods of time	1 2 3 4	1 2 3 4

4. ECONOMIC FORCES Continued	LIKELIHOOD	IMPACT
4. Force: Industrial Expansion Reasons for Importance: Need for trained technicians, technologists, and journeymen due to boom conditions Short term job-oriented training programs will be emphasized to meet immediate job market situations Emphasis on trade and technology to detriment of humanities and the arts Business and industry either cannot or will not provide the necessary training programs	1 2 3 4	1 2 3 4
5. Force: Growth in Service Sector Reason for Importance: Will lead to requests for new training programs such as tourism, hospitality, environmental development, and small business management, mainly on a part time basis	1 2 3 4	1 2 3 4
6. Force: Intensified Development of Resource Industry Reasons for Importance: Greater need for highly trained and specialized manpower, apprenticeship and semi-skilled labour Colleges will increasingly be expected to meet manpower requirements Will have a steering effect on college programs and activities Will maintain comparatively generous levels of funding; however, still considerable pressure on educational budgets Regulation of oil sands development will encourage maximum utilization of workforce Expanded demand for energy will lead to increased wealth and therefore increased business training to ensure proper utilization of this wealth	1 2 3 4	1 2 3 4

4. ECONOMIC FORCES Continued	LIKELIHOOD	IMPACT
7. Force: Cost of Education Reasons for Importance: Full time education will be more expensive relative to disposable income for the average citizen Students will assess the cost of attendance and the opportunity cost of foregone earnings versus future potential Shift to part time attendance will increase	1 2 3 4	1 2 3 4
8. Force: Changing Patterns of Remuneration Reason for Importance: Tradesmen and labourers are receiving remuneration which exceeds that received by members of the professions	1 2 3 4	1 2 3 4
9. Force: Bilateral trade agreements between Alberta and foreign countries Reason for Importance: Commerce and business administration training diversification is needed	1 2 3 4	1 2 3 4
10. Force: Private Sector Funding Increase Reason for Importance: Will broaden institutional funding base Colleges will have to answer to more masters	1 2 3 4	1 2 3 4
11. Force: Increased regulation by Federal and Provincial Governments on Economy Reason for Importance: Affects provincial migration, employment, etc.	1 2 3 4	1 2 3 4
12. Force: Increased disposable income Reason for Importance: Individuals will require increased opportunity to expend their monies on such things as further education	1 2 3 4	1 2 3 4

4. ECONOMIC FORCES Continued	LIKELIHOOD	IMPACT
13. Force: Booming construction industry Reason for Importance: May delay construction of required additional physical plant	1 2 3 4	1 2 3 4
14. Force: Heritage Trust Fund Reason For Importance: Will continue to grow as a result of primary and secondary oil industries. Government policy will inevitably favour tertiary industrial development, with training implications	1 2 3 4	1 2 3 4
15. Force: World-wide economic depression Reason for Importance: Will reduce spending levels in Alberta for adult education in relation to the provincial GNP	1 2 3 4	1 2 3 4
Further comments re: Economic Forces:		

5. DEMOGRAPHIC FORCES	LIKELIHOOD	IMPACT
1. Force: Growing Alberta Population Reasons for Importance: Continuing high population growth will provide customers for college services in years to come An increase in the number of communities requiring postsecondary education Colleges will have to be flexible and prepared to offer programs in different areas as population changes take place More people will want access to college programs and their expectations for them will tend to increase The colleges will have to continue researching the exact nature of the impact of population growth on their own institutional environments High requirement for skilled manpower in vocational areas, management; also the paraprofessions based on the humanities and social sciences (due to increased societal ills)	1 2 3 4	1 2 3 4
2. Force: Increasing In-migration Reasons for Importance: A larger population base and potentially larger source of demands on college services Will largely consist of itinerant or mobile population in construction, pipeline and petro-chemical industries Pressures will be created on timetabling, delivery of services, etc. Influence of workers and their families from economically depressed areas of Canada, a large proportion of which is unskilled Colleges will need to train unskilled workers to occupy the jobs available and avert high unemployment Tendency of unskilled to favour technical education over university education, leading to larger enrollments in diploma and certificate programs	1 2 3 4	1 2 3 4

5. DEMOGRAPHIC FORCES Continued	LIKELIHOOD	IMPACT
3. Force: Aging Population Reasons for Importance: An increase in the number of people in the 25-44 year age range seeking education and a decline in the 5-24 age range A higher percentage of the population will be over 50 and in good health requiring programs to stimulate the mind or to provide them with a third or fourth career Programs and delivery will have to acknowledge a more mature, less homogeneous student population Need for a different mix of programs with probably more emphasis on continuing education Double-barrelled programming for both mid-career shift and leisure/ retirement Different delivery modes to accommodate people who are working but wish to take courses in spare time Different orientation by instructors to their students	1 2 3 4	1 2 3 4
4. Force: Urbanization Reasons for Importance: Movement from rural to small town and larger urban centers will mean that colleges will be serving a larger proportion of students within commuting distance The concentration of growth and industrial and economic enterprises will continue to be centralized in the Edmonton and Calgary areas meaning that colleges such as GMCC and MRC will continue to outgrow other colleges in the province Increased urban population will require increase in social well-being programs and continuing and further education Fewer people in rural areas will necessitate more concentration in delivery of outreach and distance learning	1 2 3 4	1 2 3 4

5. DEMOGRAPHIC FORCES Continued	LIKELIHOOD	IMPACT
5. Force: Regional Expansion Reasons for Importance: People will concentrate in certain areas where rapid development of natural resources occurs leading to the need for on-site or local training Greater pressures in colleges in areas where energy developments are taking place Colleges can provide the service industry personnel to help develop the new communities into desirable places to live Greater regional concentration of needs for particular skills--colleges could specialize and adjust the kinds of programs they will offer The desire of government to regionalize services, as well as new industries coming into the province, will make small colleges larger and more effective and efficient	1 2 3 4	1 2 3 4
6. Force: More Women in the Labour Force Reasons for Importance: More women seeking postsecondary education as greater inroads are made into previously male-dominated occupations Increased pressures for day care and early childhood services and therefore need for training programs in these areas Changes in existing programs required to meet the needs of this group Increased number of courses, seminars, workshops, and programs to accommodate the needs of women interested in joining the workforce	1 2 3 4	1 2 3 4

5. DEMOGRAPHIC FORCES Continued	LIKELIHOOD	IMPACT
7. Force: Immigration Reasons for Importance: Federal immigration policy will influence Alberta's demography, creating a cosmopolitan community which will make its demands on the college system Requirements for special programming for new citizens who require enculturation, language training, basic education, and upgrading Large demand for skill and apprenticeship programs and later, more continuing education High mobility and transient population will lead to social program which the colleges will be asked to deal with, at least in part More crime and social disorientation; therefore more seminars and workshops to assist social agencies Adjustments to Canadian Society will bring benefits as well as demands for assistance	1 2 3 4	1 2 3 4
Additional Comment: See the recent report of the Planning secretariat of AAEM entitled "Demographic and Manpower Trends in Alberta: Possible Impact on the Advanced Education System 1971 - 1988" Write Mr. T.N. Pollard, Executive Director, 11160 Jasper Avenue (Devonian Building) Edmonton, Alberta, T5K 0L1.		
Further Comments Re: Demographic Forces:		

6. ECOLOGICAL FORCES	LIKELIHOOD	IMPACT
1. Force: Environmental Control Reasons for Importance: Growing concern for pollution control and increased desire for clean air, clean water, and, in general, a controlled environment all of which will have an impact on college training patterns The interest in the preservation of the natural environment and the pressures to educate--even force--people to care for their habitat Awareness of ecological hazards will lead to increasing demands on colleges to impart knowledge to improve handling of dangerous substances and allay fear More demand for training in land utilization, training, and other aspects of land management. Although demand to take ecological systems into account may be low, training programs might consider the factor Environmentalists will continue to be a significant balancing force to slow down federal, provincial, and municipal governments in quickly approving development plans. Colleges may be expected to provide spokesmanship or leadership in public forums	1 2 3 4	1 2 3 4
2. Force: Articulation of Postsecondary Institutions Reasons for Importance: Provincial legislation may well require increased integration to rationalize existing spaces in higher education and to avoid costly duplication of facilities and program services Working relationships both within institutions and between Department and institutions will have to be streamlined to ensure responsiveness to system-wide needs Community demands for establishment of colleges will result in consortia formation among existing colleges to deliver programs in areas where the establishment of a college would not be feasible Brokering from other institutions will lead to higher levels of accountability with more activity in the areas of program review, program evaluation, and fund raising	1 2 3 4	1 2 3 4

6. ECOLOGICAL FORCES Continued	LIKELIHOOD	IMPACT
3. Force: Increased leisure time Reason for Importance: Will strain reserve land and recreational land because of a significant portion of leisure time being expended outside urban areas	1 2 3 4	1 2 3 4
4. Force: Reduction in private transport Reason for Importance: Conservation of energy will necessitate change to more public transport and accordingly less requirement for support people to private transport	1 2 3 4	1 2 3 4
5. Force: Decrease in land available for single family housing Reason for Importance: Increased multi-family housing has significant impact on adjustment of individuals to cope with group living	1 2 3 4	1 2 3 4
6. Force The physical location of the colleges Reason for Importance: Colleges will have to be responsive to the needs of their communities. The programs offered will be shaped to some extent by the natural environment e.g. farming country	1 2 3 4	1 2 3 4

6. ECOLOGICAL FORCES Continued	LIKELIHOOD	IMPACT

Additional Comment:

Unfortunately, little will be done before 1990 with regard to pollution which will have significant impact on college training patterns

Further Comments Re: Ecological Forces:

7. CULTURAL/SOCIETAL FORCES	LIKELIHOOD	IMPACT
1. Force: High Mobility Reasons for Importance: Human development education will be needed to facilitate adaption and coping with stress Colleges can provide social service personnel to help handle the problems related to a large migrant sector within the population	1 2 3 4	1 2 3 4
2. Force: Fragmentation of the Family Unit Reasons for Importance: Increased number of programs to assist individuals to cope e.g. single parenting, workshops for kids Colleges will have to improve support systems for single parents and individuals re: entering the workforce-- higher levels of flexibility in student finance, admissions, part-time attendance, student residences, child care, and scheduling	1 2 3 4	1 2 3 4
3. Force: Increased Leisure Time Reasons for Importance: Further reduction in hours or work will create a greater demand for leisure and general interest courses Colleges can assist individuals in achieving fulfilment Greater orientation towards self-reliance will create pressure for courses of a practical nature Return to the old way of doing things and consequent pressure to strike a balance between the "good old days" and modern technology	1 2 3 4	1 2 3 4

7. CULTURAL/SOCIETAL FORCES Continued	LIKELIHOOD	IMPACT
4. Force: The Value of Education Reasons for Importance: Reassesssment of the value of education for its own sake; need for shorter term programs and quicker results The university has to some extent fallen from grace; it is no longer a second class route to go to college When society determines that a college education is desirable, there is a greater incentive for people to attend Shift from liberal arts orientation required to attract students, yet a need to balance employment-related programs with liberal arts The interests in skills and the demand for such training at a time when the liberal arts and post-retirement abilities are also being stressed raises the questions, how can all of these needs be met, and by whom or which institutions?	1 2 3 4	1 2 3 4
5. Force: Changing Role of Women Reasons for Importance: Will have implications for programming--need to train women returning to the workforce as well as for traditionally male programs Will contribute to familial instability and bring pressure for reassessment of family relationships	1 2 3 4	1 2 3 4
6. Force: Multiculturalism Reasons for Importance: Colleges will be expected to respond to the cultural aspirations of different ethnic groups Colleges will be expected to use the services of people from the community to teach ethnic arts	1 2 3 4	1 2 3 4

7. CULTURAL/SOCIETAL FORCES Continued	LIKELIHOOD	IMPACT
7. Force: Democratization of Decision Making Reasons for Importance: Acceptance of an individual's right to question on a personal basis or through a group or organization Demands on public figures to be open and discuss before making a decision Degree of participation of faculty and students in decision making affects the direction of a college and the speed with which decisions are made College boards will seek to have the same power as university boards to achieve a significantly higher level of autonomy than now experienced Legislative changes towards public governance for some postsecondary institutions Pressure on government to encourage public participation in postsecondary education	1 2 3 4	1 2 3 4
8. Force: Community demands on the colleges Reason for Importance: Expectation of the community that the resources of the colleges should be used to assist in the development of solutions to community problems	1 2 3 4	1 2 3 4
9. Force: Increased public service Reason for Importance: Greatest future prospects for employment will be in social welfare, health services, recreation, etc.	1 2 3 4	1 2 3 4

7. CULTURAL/SOCIETAL FORCES Continued	LIKELIHOOD	IMPACT
10. Force: Changing Attitudes		
Changing student motivation toward careers--a different population from a decade ago	1 2 3 4	1 2 3 4
Drift toward socialism means a shift in educational priorities toward "people needs"	1 2 3 4	1 2 3 4
Return to religion will result in churches and their related organizations taking back some of the social and educational functions picked up by colleges in the last decade	1 2 3 4	1 2 3 4
The new freedom puts pressure on colleges to cope with lifestyle changes in what is basically a conservative atmosphere	1 2 3 4	1 2 3 4
Citizen involvement will lead to greater emphasis on community service programs and greater expectation for community assistance by the colleges	1 2 3 4	1 2 3 4
Tendency to question traditional values will maintain a decade of great social and cultural turbulence	1 2 3 4	1 2 3 4
Recognition of absurdity of artificially created states of life (adolescence, retirement) will lead to a diversified clientele with diversified demands	1 2 3 4	1 2 3 4
Change as a way of life will produce a never-ending stream of social and psychological casualties in need of personal services	1 2 3 4	1 2 3 4

7. CULTURAL/SOCIETAL FORCES Continued	LIKELIHOOD	IMPACT

Further Comments Re: Cultural/Societal Forces:

GENERAL ADDITIONAL COMMENTS:

Colleges will be getting many mixed messages resulting from the difficulty of government, local citizens, faculty, and students to have a common understanding of what is going on around them. Western society in general will undergo a turbulent shift from a mechanistic world view characterized by hierarchies and specializations toward an ecological world view characterized by networks and inter-dependence. For this reason it will be a decade of considerable tension especially for colleges with inflexible administrative structures.

Further General Comments:

APPENDIX 3

PACKAGE OF MATERIALS, ROUND III

LETTER TO COLLEGE PRESIDENTS

October 22, 1980

Here is your package of materials for the final round of the Delphi study "Environmental Forces and Community Colleges in the '80's" which I am conducting in partial fulfilment of my doctoral dissertation in Educational Administration.

The major environmental forces in the Eighties as identified from your responses to Round II are included on the green sheet for your information. (Please note that Additional Comments from Round II will be incorporated into the final report.)

Your task for Round III is to rate the influence of each of the major environmental forces on policy decisions to be made in the next decade in response to the need for technological training and retraining (this was identified as the most important force by respondents in Round II). Secondly, you are requested to suggest possible ways that colleges can adjust to each environmental force when considering policy decisions in the area of technological training and retraining.

Due to the brief time remaining to complete the study, please have your questionnaire completed by October 31, 1980. Due to losses and delays which have been encountered in the mails, kindly return by Special Delivery. Also make sure that you retain your file copy with your answers.

The response to the study has remained above the ninety percent level. Thank you for your continued interest and cooperation.

Yours truly

Gail V. Barrington
Doctoral Candidate, Educational Administration
(432-3094) or (436-5728)

LETTER TO ALBERTA ADVANCED EDUCATION OFFICIALS

October 22, 1980

Here is your package of materials for the final round of the Delphi study "Environmental Forces and Community Colleges in the '80's" which I am conducting in partial fulfilment of my doctoral dissertation in Educational Administration.

The major enviromental forces in the Eighties as identified by your responses to Round II are included on the green sheet for your information. (Please note that Additional Comments from Round II will be incorporated into the final report.)

Your task for Round III is to rate the influence of each of the major enviromental forces on policy decisions to be made in the next decade in response to the need for technological training and retraining (this was identified as the most important force by respondents in Round II). Secondly, you are requested to suggest possible ways that colleges can adjust to each environmental force when considering policy decisions in the area of technological training and retraining.

Due to the brief time remaining to complete the study, please have your questionnaire completed by October 31, 1980. Due to losses and delays which have been encountered in the mails, kindly hold for pick up on October 31, 1980.

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RANK ORDERED LIST OF MAJOR ENVIRONMENTAL FORCES AS IDENTIFIED IN ROUND II

RANK ORDER	ENVIRONMENTAL FORCE
1	Technological Demand for Training and Retraining
2	Growing Alberta Population
3	Intensified Development of Resource Industry
4	Inflation Industry as a Pressure Group Increasing In-migration
5	Buoyant Economy Decentralization of College Services by Region Regional Expansion of Population
6	Faculty as a Pressure Group Government Policy of Fiscal Restraint Industrial Expansion Computer Technology
7	Growth in the Service Sector
8	Government Priorities among All Sectors Different Student Population

ENVIRONMENTAL FORCES AND COMMUNITY COLLEGES IN THE '80'S

ROUND III

POLICY ANALYSIS

RATING KEY

INFLUENCE OF A PARTICULAR ENVIRONMENTAL FORCE ON FUTURE POLICY DECISIONS REGARDING TECHNOLOGICAL TRAINING AND RETRAINING IN THE NEXT DECADE

Scale Reference		Definitions
1	HIGH INFLUENCE	Will have a major bearing on policy decisions in this area A first order priority Not to be ignored Must be dealt with first
2	MODERATE INFLUENCE	Will have some bearing on policy decisions in this area A second order priority Significant but only after other forces are dealt with
3	LOW INFLUENCE	Will have insignificant bearing on policy decisions in this area A third order priority Could reasonable be excluded from policy considerations in this area
4	NO INFLUENCE	No relevance for policy decisions in this area No priority Not a determining factor An irrelevant item--should be dropped

ROUND III. POLICY ANALYSIS

Look ahead ten years at the Alberta college system. How influential will each of the following environmental forces be on future policy decisions in the area of Technological Training and Retraining? How can colleges adjust to meet the demands placed on them by each environmental force when developing policy in this area?

1. Please rate the influence in the next decade of each environmental force on future policy decisions which will be made in response to the increasing need for technological training and retraining. (Consult the orange sheet for an interpretation of the rating scale.)

2. Suggest possible ways that colleges can adjust to each environmental force when considering future policy decisions in the area of technological training and retraining. (Additional space for comments is provided on page 5.)

ENVIRONMENTAL FORCE	POLICY DECISION AREA	HIGH INFLUENCE	MODERATE INFLUENCE	LOW INFLUENCE	NO INFLUENCE	POSSIBLE COLLEGE ADJUSTMENTS
1. A Growing Alberta Population	Technological Training and Retraining	1	2	3	4	1. 2. 3.
2. The Intensified Development of the Resource Industry	Technological Training and Retraining	1	2	3	4	1. 2. 3.

ENVIRONMENTAL FORCE	POLICY DECISION AREA	HIGH INFLUENCE	MODERATE INFLUENCE	LOW INFLUENCE	NO INFLUENCE	POSSIBLE COLLEGE ADJUSTMENTS
3. Inflation	Technological Training and Retraining	1	2	3	4	1. 2. 3.
4. Industry as a Pressure Group	Technological Training and Retraining	1	2	3	4	1. 2. 3.
5. Increasing In-migration	Technological Training and Retraining	1	2	3	4	1. 2. 3.
6. A Buoyant Economy	Technological Training and Retraining	1	2	3	4	1. 2. 3.

ENVIRONMENTAL FORCE	POLICY DECISION AREA	HIGH INFLUENCE	MODERATE INFLUENCE	LOW INFLUENCE	NO INFLUENCE	POSSIBLE COLLEGE ADJUSTMENTS
7. Decentralization of College Services by Region	Technological Training and Retraining	1	2	3	4	1. 2. 3.
8. Regional Expansion of the Population	Technological Training and Retraining	1	2	3	4	1. 2. 3.
9. Faculty as a Pressure Group	Technological Training and Retraining	1	2	3	4	1. 2. 3.
10. A Government Policy of Fiscal Restraint	Technological Training and Retraining	1	2	3	4	1. 2. 3.

ENVIRONMENTAL FORCE	POLICY DECISION AREA	HIGH INFLUENCE	MODERATE INFLUENCE	LOW INFLUENCE	NO INFLUENCE	POSSIBLE COLLEGE ADJUSTMENTS
11. Industrial Expansion	Technological Training and Retraining	1	2	3	4	1. 2. 3.
12. Computer Technology	Technological Training and Retraining	1	2	3	4	1. 2. 3.
13. Growth in the Service Sector	Technological Training and Retraining	1	2	3	4	1. 2. 3.
14. Government Priorities among All Sectors	Technological Training and Retraining	1	2	3	4	1. 2. 3.

ENVIRONMENTAL FORCE	POLICY DECISION AREA	HIGH INFLUENCE	MODERATE INFLUENCE	LOW INFLUENCE	NO INFLUENCE	POSSIBLE COLLEGE ADJUSTMENTS
15. A Different Student Population	Technological Training and Retraining	1	2	3	4	1. 2. 3.

ADDITIONAL COMMENTS:

APPENDIX 4

RANK-ORDERED LIST OF MAJOR ENVIRONMENTAL FORCES WITH REASONS FOR IMPORTANCE, ROUND II

RANK-ORDERED LIST OF MAJOR ENVIRONMENTAL FORCES WITH REASONS FOR IMPORTANCE, ROUND II

1. Force: Technological Demand for Training and Retraining

Reasons for Importance:

Need to expand Alberta's capability to train skilled manpower.

Need to provide greater access to training in high demand occupational areas.

Increasing need to retrain people who become technologically displaced.

Need to maintain knowledge and skill levels of the labour force.

Need for colleges to be constantly aware of current and possible future changes in technology.

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2. Force: Growing Alberta Population

Reasons for Importance:

Continuing high population growth will provide customers for college services in years to come.

An increase in the number of communities requiring postsecondary education.

Colleges will have to be flexible and prepared to offer programs in different areas as population changes take place.

More people will want access to college programs and their expectations for them will tend to increase.

The colleges will have to continue researching the exact nature of the impact of population growth on their own institutional environments.

High requirement for skilled manpower in vocational areas, management; also the paraprofessions based on the humanities and social sciences (due to increased societal ills).

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3. Force: Intensified Development of Resource Industry

Reasons for Importance:

Greater need for highly trained and specialized manpower, apprenticeship and semi-skilled labour.

Colleges will increasingly be expected to meet manpower requirements.

Will have a steering effect on college programs and activities.

Will maintain comparatively generous levels of funding; however, still considerable pressure on educational budgets.

Regulation of oil sands development will encourage maximum utilization of workforce.

Expanded demand for energy will lead to increased wealth and therefore increased business training to ensure proper utilization of this wealth.

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4. Force: Inflation

Reasons for Importance:

Colleges will have to economize and allocate their limited funds in the most effective and efficient manner.

Budget increases consistently less than the rate of inflation causing difficult decision making by boards and administrators regarding reduction in services, programs and staff.

Curbs to off-set inflation may lead to higher employment and a return to postsecondary education of some form.

Higher cost of education; greater loss of potential earning; need to maintain standard of living accustomed to.

Force: Industry as a Pressure Group

Reasons for Importance:

Demand for more skilled labour.

Forecast shortage in mid-level technical skills will lead to increased emphasis on vocational and technical education.

Inflexibility of apprenticeship training will be attacked and modified.

Seeking more say in subjects taught and methodologies.

Growth in size and amount of money paid for taxes and fees accompanied by desire for more say in direction of postsecondary education.

Demand for more industry-based training will lead to greater communication and cooperation between colleges and the private sector and will result in programs reflecting more precisely the demands of the labour market.

Emphasis on practical training will decrease role of universities and give colleges a larger slice of the postsecondary dollar.

Industry will influence government to respond to manpower demands.

Industry may offer assistance with capital, equipment, on-the-job training, etc.

Force: Increasing In-migration

Reasons for Importance:

A larger population base and potentially larger source of demands on college services.

Will largely consist of itinerant or mobile population in construction, pipeline and petro-chemical industries.

Pressures will be created on time-tabling, delivery of services, etc.

Influence of workers and their families from economically depressed areas of Canada, a large proportion of which is unskilled.

College will need to train unskilled workers to occupy the jobs available and avert high unemployment.

Tendency of unskilled to favour technical education over university education, leading to larger enrollments in diploma and certificate programs.

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5. Force: Buoyant Economy

Reasons for Importance:

Strong employment market.

Students may enter workforce directly from high school.

Lower enrollment in full time students but marked increase in part time.

Increased demands by students wishing to study during non-traditional periods of time.

Force: Decentralization of College Services by Region

Reason for Importance:

Will result in colleges attempting to provide the spectrum of post-secondary education while trying to be more responsive.

Force: Regional Expansion of Population

Reasons for Importance:

People will concentrate in certain areas where rapid development of natural resources occurs leading to the need for on-site or local training.

Greater pressures in colleges in areas where energy developments are taking place.

Colleges can provide the service industry personnel to help develop the new communities into desirable places to live.

Greater regional concentration of needs for particular skills—colleges could specialize and adjust the kinds of programs they will offer.

The desire of government to regionalize services, as well as new industries coming into the provinces, will make small colleges larger and more effective and efficient.

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6. Force: Faculty as a Pressure Group

Reasons for Importance:

Unionization and the attainment of legal status and rights will have an increasing impact on internal operations, making it increasingly difficult to reduce staff which is redundant or incompetent.

Influence due to sizable numbers in the provincial association.

Power developing through the collective bargaining process.

The pressure to find security.

Lack of flexibility due to rigid faculty contracts will impede the colleges because of fixed workloads and the high cost of instruction culminating in increased costs without increased productivity.

Negotiations will be more restricted and the trends to lower workloads and higher salaries will be moderated affecting colleges' ability to hire staff.

Who controls the educational process—management or academic staff?

Litigation re: contract fulfillment—do fees provide the opportunity to participate or is there an implied right of a minimum level of achievement?

Force: Industrial Expansion

Reasons for Importance:

Need for trained technicians, technologists, and journeymen due to boom conditions.

Short term job-oriented training programs will be emphasized to meet immediate job market situations.

Emphasis on trade and technology to detriment of humanities and the arts.

Business and industry either cannot or will not provide the necessary training programs.

Force: Government Policy of Fiscal Restraint

Reasons for Importance:

Colleges will continue to be under pressure to increase efficiency and productivity.

Will limit rate of growth and availability of capital and operational dollars.

Affects priorities that can be met.

Continuation of staff and service cuts.

Excessive dependence on government grants will threaten college autonomy.

As colleges move toward a business model, more time will be required for fund raising. This will lead to a different set of management responsibilities and fiscal policies at all college levels.

With the end of the era of huge transfers of public money to institutions, massive infusions of money will be made in the name of Catch-up or Start-up grounds. These will be for politically motivated activities such as safety, industry, and scientific research.

Force: Computer Technology

Reasons for Importance:

Computer applications will become increasingly required in the basic educational background of business, scientific and management preparation programs as well as in secretarial sciences.

New job functions will be created; many existing jobs will be replaced by automation.

Demand for conventional programs such as Bookkeeping will decline.

7. Force: Growth in Service Sector

Reasons for Importance:

Will lead to requests for new training programs such as tourism, hospitality, environmental development, and small business management, mainly on a part time basis.

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8. Force: Government Priorities among All Sectors

Reasons for Importance:

Will limit public support for postsecondary education.

Will require greater accountability from the colleges.

Will force colleges to take initiative to find new ways of meeting financial needs.

Will determine growth rate of programs and regional expansion.

Areas of innovation may be supported by Heritage funds.

Dependence on government grants will occur at the expense of college autonomy.

Force: Changing Attitudes

Reasons for Importance:

Changing student motivation toward careers—a different population from a decade ago.

APPENDIX 5

POSSIBLE COLLEGE ADJUSTMENTS, ROUND III

POSSIBLE COLLEGE ADJUSTMENTS, ROUND III

Major Impact: Demands for Flexibility

Impact Area	Possible College Adjustments
1. Programming	a. Assess requirements in industry and develop innovative courses and programs to provide training and retraining in marketable skills. (33 responses)
	b. Develop the capability to provide more extensive, short-term upgrading and retraining courses and programs, possibly using competency-based methods. (19 responses)
	c. Phase out programs and services in low demand. (8 responses)
	d. Reexamine mission statement in the light of training needs and restrict area of specialty. (6 responses)
	e. Review demand for information processing personnel and develop appropriate computer-related programs. (5 responses)
	f. Maintain a health balance between liberal and fine arts and career and trade programs (5 responses)
	g. Develop service courses to increase computer literacy in all students. (3 responses)
	h. Offer courses rather than programs. (3 responses)
	i. Increase ESL offerings. (2 responses)
	j. Respond to areas of training favoured by government. (1 response)
	k. Rationalize existing programs. (1 response)
	l. Accumulate non-traditional activities in some institutions. (1 response)
	m. Drop unrealistic requirements for certification. (1 response)

Impact Area	Possible College Adjustments
1. Programming (cont'd)	n. Involve faculty in program decisions. (1 response)
	o. Expand further education. (1 response)
2. Delivery Systems	a. Participate in consortia delivery systems. (11 responses)
	b. Devise cost-effective, less labour-intensive delivery systems and maintain cost/benefit analysis. (11 responses)
	c. Develop innovative means for program delivery off campus, such as delivery at the industrial site. (11 responses)
	d. Adapt program delivery to part-time study. (7 responses)
	e. Assess and utilize computer technology in the instructional process both on and off campus. (5 responses)
	f. Create an instructional development capability to improve delivery systems. (2 responses)
	g. Expand regional delivery of programs and courses. (1 response)
3. Faculty Affairs	a. Ensure faculty relevance through retraining in such areas as innovative teaching-learning strategies, the uses of technology, and cost-consciousness. (10 responses)
	b. Secure staff with specialized skills such as industrial and business experience/knowledge and computer competency. (5 responses)
	c. Ensure integration of liberal arts and trades instructors. (3 responses)
	d. Ensure mutual understanding by sharing all available information. (3 responses)

Impact Area		Possible College Adjustments
4. Facilities and Services	a.	Expand facilities regionally; decentralize services. (11 responses)
	b.	Expand and develop counselling and student services operations and learning centers. (5 responses)
	c.	Plan to expand facilities but maintain a flexible stance due to possible government shifts. (2 responses)
	d.	Increase housing facilities for married students, possibly in keeping with ability to pay. (2 responses)
	e.	Get maximum use of existing facilities. (2 responses)
	f.	Revamp students' council functions. (1 response)
5. Scheduling and Admissions	a.	Consider an extended day and year to accommodate increased numbers and maximize capital investment. (5 responses)
	b.	Adjust to increased attendance by part-timers and to the need for short courses. (3 responses)
	c.	Establish quotas where necessary, possibly based on residency. (2 responses)
	d.	Develop means for additional program intakes. (2 responses)
	e.	Economize by creating larger classes. (2 responses)
	f.	Increase standards. (1 response)

Impact Area	Possible College Adjustments
6. Liaison with Other Institutions	a. Draw on the expertise of NAIT, SAIT, and ACCESS. (2 responses)
	b. Make arrangements with other institutions to share costs and use of facilities, programs, etc. (1 response)
	c. Develop awareness among all colleges of the postsecondary needs of industry. (1 response)
	d. Work with other colleges and the universities to develop a common approach to government. (1 response)
	e. Broker expensive programs from other institutions. (1 response)

Major Impact: Demands for Accountability

Impact Area	Possible College Adjustments
1. Planning	a. Use inventive, future-oriented planning to maintain an appropriate volume of services and to cope with change. (18 responses)
	b. Develop a greater commitment to integrated, longer-term planning. (8 responses)
	c. Assess requirements of the new student population by both obtaining demographic data and interacting with students to understand their needs. (6 responses)
	d. Engage in overall planning rather than merely responding to technologically-based training, being aware of possible shifts in emphasis. (2 responses)

Impact Area	Possible College Adjustments
1. Planning (cont'd)	e. Develop and maintain data on student profiles, including graduate employment figures. (2 responses)
	f. Review all programs periodically to justify future viability; they should be considered part of a flexible whole. (1 response)
2. Funding	a. Generate alternate sources of revenue by challenging industry to assist with resources such as funds, space, and equipment. (12 responses)
	b. Develop collective bargaining skills, learn to deal with the union mentality and accommodate faculty demands where feasible. (6 responses)
	c. Devise means of program delivery which generate profit. (6 responses)
	d. Adopt different types of faculty contracts for different kinds of teaching activities. (2 responses)
	e. Evaluate elasticity of student population regarding fees. (1 response)
	f. Negotiate for greater workloads. (1 response)
	g. Encourage fund raising by colleges. (1 response)
	h. Adjust operating and capital budgets to reflect inflation. (1 response)
	i. Transfer available funds to meet government priorities in training. (1 response)
	j. Increase budgets to reflect decentralization. (1 response)

Impact Area	Possible College Adjustments
3. Liaison with Industry	a. Monitor industry's requirements and training capabilities. (7 responses)
	b. Engage in joint educational programming such as work-study programs. (6 responses)
	c. Get more industry and business representatives on advisory committees and boards of governors. (6 responses)
	d. Enhance liaison with industry to develop mutual understanding; be responsive. (5 responses)
	e. Evaluate requests against actual training needs; respond according to an overall institutional development plan. (2 responses)
	f. Pass responsibility for specialized training to industry. (1 response)
4. Liaison with Government	a. Work with government to obtain accurate regional demographic data and manpower requirements. (8 responses)
	b. Develop lobbying skills and accommodation strategies; present alternate proposals if priorities differ. (8 responses)
	c. Work closely with government on coordination and planning activities. (2 responses)
	d. Be aware of Federal-Provincial relationships. (1 response)
	e. Apply pressure for an inter-provincial agreement for compensation. (1 response)
	f. Heighten awareness of the Legislature that the colleges' contribution is as significant as the universities' yet they do not receive their proportionate share of the postsecondary dollar. (1 response)

Impact Area	Possible College Adjustments
4. Liaison with Government (cont'd)	g. Increase government's awareness of training needs in the service industries. (1 response)
5. Effectiveness/ Efficiency	a. Reallocate resources carefully, maximizing capital assets usage, transferring government support to operating needs and increasing short-run strategies. (11 responses)
	b. Balance participation of faculty with their need to be accountable to overall college objectives. (2 responses)
	c. Utilize computers to enhance management. (1 response)
	d. Learn to do more with less. (1 response)
6. Liaison with the Public	a. Develop new approaches regarding accountability. (3 responses)
	b. Enhance college image to increase credibility and attract students to study part-time and work part-time. (2 responses)
	c. Increase public's awareness of training needs in the service sector. (2 responses)
	d. Educate the public to the contribution of the college system in order to pressure government to make it a high social priority. (1 response)

APPENDIX 6

RESPONDENTS' COMMENTS, ROUND I

Respondents' Comments[1]—Round I

I. Technological Forces

There are no technologies which are currently not known which will contribute to or influence postsecondary education in Alberta during the 1980's.

It is important to design the instructional mode so as not to lose the human element.

Most colleges are ill-equipped and ill-informed to make intelligent choices regarding computers.

II. Demographic Forces

See the recent report of the Planning secretariat of AAEM entitled "Demographic and Manpower Trends in Alberta: Possible Impact on the Advanced Education System 1971-1988." Write Mr. T. N. Pollard, Executive Director, 11160 Jasper Avenue (Devonian Building) Edmonton, Alberta, T5K 0L1.

III. Ecological Forces

Unfortunately, little will be done before 1990 with regard to pollution which will have significant impact on college training patterns.

IV. General Additional Comments

Colleges will be getting many mixed messages resulting from the difficulty of government, local citizens, faculty, and students to have a common understanding of what is going on around them. Western society in general will undergo a turbulent shift from a mechanistic world view characterized by hierarchies and specializations toward an ecological world view characterized by networks and inter-dependence. For this reason it will be a decade of considerable tension especially for colleges with inflexible administrative structures.

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[1] One original questionnaire was lost in the mail. The second copy contained no comments.

APPENDIX 7

RESPONDENTS' COMMENTS, ROUND II

Respondents' Comments[1]—Round II

I. Technological Forces

1. Technological Demand for Training and Retraining

   - All of the Reasons for Importance will apply.

3. Tar Sands Technology

   - As my college does not have technical programs, my answer reflects a general judgment instead.

4. Medical Technology

   - This impact will apply selectively to some institutions and not to others.

5. Computer Technology

   - This technology will be introduced differentially, but will affect all institutions' business programs and other areas.

6. The Market Rate for Qualified Instructors

   - Lifestyle and long vacation periods help counterbalance market trends.

   - The working environment of colleges will provide an attractive alternative to private sector employment.

7. Satellite Communications

   - Channels exist for educational TV; more channels won't change things much. So far educational TV hasn't caught on very well.

   - This technology will be applied differentially to the system. The extent to which Edmonton/Calgary institutions participate will be a function of the innovation and spare resources (?) provided to regional colleges.

8. Cable TV

   - This force will be ameliorated (?) by the resentment (?) mounted (?) by traditional classroom-oriented academic staff.

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[1] Two original questionnaires were lost in the mail. The second copies contained no comments. Apologies may be in order for faulty deciphering of handwriting. Unclear words are followed by (?).

9. Television

   - High personal costs will moderate the acceptance of this technology.

11. Fibre Optics

   - Have no idea.

12. Technological Advances in Teaching Modes

   - Will have some impact on students using, say, computer techniques for modelling, etc.; but I have yet to see a CAI system that justified its cost or was really an adequate substitute for a live instructor or a good textbook.

   - Forces 10-12 (Conference Telephone, Fibre Optics, and Technological Advances in Teaching Modes) will be modified by the normal system reactions to dramatic change. The rate of change will be modest, but significant, over the next decade, using 1980 as a baseline.

13. Improved Data Storage and Retrieval

   - The administration of the system will force this as a priority development.

14. Word Processing

   - The advantages are evident and non-threatening to employees.

15. Advances in Learning Theory

   - A modest change can be forecast.

16. Increased Utilization of Natural Renewable Resources

   - Alberta's great current wealth will not allow revolutionary changes to be a felt necessity in the short term.

Additional Comments

In response to Round I comments, the following remarks were made:

Round I - There are no technologies which are currently not known which will contribute to or influence post-secondary education in Alberta during the 1980's.

Round II - Agree.

- Not true.

- Agree. Educational technology will not have significant impact in the '80's or even in this century.

Round I - It is important to design the instructional mode so as not to lose the human element.

Round II - Quite so.

- True.

Round I - Most colleges are ill-equipped and ill-informed to make intelligent choices regarding computers.

Round II - ?

- Not relevant.

- True.

9

Further comments related to Technological Forces, Round II

- The greatest affects on the college system will come from developments in the resource industries, electronics (e.g. satellites), the use of computers and word processors.

  The retraining and upgrading of staff (including faculty) and the ability to hire qualified personnel will directly affect the development of the college system.

  There will be a tendency on the part of persons in the college system to not want to change or adapt.

- The college system, under current funding arrangements, is slow to respond to current changes in technology. There seems to be about a 10 year gap between technological developments and adoption by the system.

- If Alberta adopts a coherent strategy for developing a diversified economy—for example, a commitment to foster a world-class computer industry—that would (and should) have an impact on the college system.

- The technological forces identified are all of a nature which could be very significant, providing:
  (a) the funding climate for major capital investment is acceptable to government
  (b) the climate for innovation is carefully nurtured within institutions of the college system.

- There will have to be reasons other than those presently believed by some people—before educational technology is used. e.g., If the economy became so poor that our standard of living became exceedingly low—then mass TV education would be all that could be afforded.

- I note that you did not break out the development of the micro processor as a separate technological force. In making this editorial judgment, I believe you have missed the single most important technological development of the next twenty years. This development is already beginning to revolutionize industry in terms of the automation process. It is also going to revolutionarize our personal lives by putting the full computing power of what were large main frame computers only 5-10 years ago into the hands of the average person.

  Also, you left videodisc out of the list of technological developments and I believe it is going to be more significant than most of the others in terms of impact on the educational process.

  Also, I am wondering if number 9 (Television) was meant to be Telidon, as the reason you have given relates to that development rather than television as we know it today.

  [This last set of comments was later supported by the submission of the following article.]

The Electronics Revolution and You
Overcoming the Resistance to Revolutionary Change

By Harry J. Gray, Chairman, Chief Executive Officer,
United Technologies Corporation
Delivered at Florida Institute of Technology, Melbourne, Florida,
June 14, 1980

(Reprinted from Vital Speeches of the Day, 48(20):635-637
August 1, 1980.)

First of all, I want to congratulate each of you for the accomplishments that earned you a place among the graduates of 1980. You and others in this class had to master an extraordinary volume of accumulated knowledge. The degree you are about to receive is a tribute to your intelligence, your dedication and—most of all—to years of long, hard work.

I guarantee you it was worth it, because the education you received is more important than every. Graduates of technical universities have skills that are badly needed in today's society.

That's a big change from the start of the last decade. In 1970, every time someone wrote an article about technical people, they seemed to lead off with a story about engineers who were driving cabs or waiting on tables.

Today I'd like to talk about a major reason for the change: the fact that technology is going through a revolution, and there are more opportunities than there are trained people to make the most of them.

In the history of technology, true upheavals have occurred only rarely. Historians, scientists and engineers are cautious about calling any event a revolution.

That's why it's significant when they talk about a revolution going on today . . . about a development that will change civilization as much as the printing press or steam engine.

Those of you who read "Science" journal regularly know that its opinion pieces generally are as low-key as its technical reports. So one should pay close attention when this magazine calls the development "one of the greatest intellectual achievements of mankind," and says it will make reality "outstrip fiction."

I'm talking about tiny chips of silicon that engineers call "integrated circuits." Just one of them replaces thousands of old-fashioned electronic circuits. They reached the point in the early 1970's where all the circuits essential to a computer could be put on one chip, known as a microprocessor.

At the end of the decade, microelectronics was just coming into its own. You know the most visible results: pocket calculators . . . video games . . . digital watches . . . all the new electronic wonders.

Chips truly are marvels of technology, yet actually they aren't very impressive to the naked eye. They're made of tiny black rectangles of silicon that look like flakes of pepper. But through a microscope you can see that each of them contains miniature transistors and capacitors—scores and scores of them. We make one chip on which the number of these components is about 140,000.

Many of us believe these remarkable chips are leading civilization into a new era. Like the industrial revolution that extended the influence of man's muscles, the electronics revolution will extend the influence of his mind, enabling him to reach new levels of mastery and control.

The revolution is spreading throughout society. Many of you can contribute directly to the new technology. Most of you will work with it. All of us will benefit. The opportunities for you to achieve personal success and to make a difference to the world are virtually unlimited.

At UTC, it's been plain to us that electronics is a major market for the future. So, last November we brought together several of our operations into a new Electronics Group.

And it was just last Monday that our board of directors approved plans to establish a new microelectronics applied research laboratory in Colorado Springs, Colorado. Both moves will help us apply chips to all our product lines.

I'd like to share with you some things that excite me about the new electronics, its applications and its challenges.

Let's start by comparing the new with the old. Vacuum tubes that used to power bulky old radios aren't seen much anymore. Miracle chips are more rugged, more reliable and a lot more versatile.

I'm familiar with one kind of microprocessor that's been programmed as an automatic depth finder for fishing fleets, as well as a regulator of flow in gasoline pumps. The ability to program one standard product to do many different things is a big advantage of the new technology.

Of the many virtues of today's chips, one is most responsible for the electronics explosion . . . and that's their low cost. They're a tremendous bargain, considering all they do. You can buy electronic calculators now for only a small fraction of the cost of old mechanical calculators.

The key factor is that one inexpensive chip can hold so many components. And every new chip design gives you more bang for the buck, because the number of electronic elements per chip has typically doubled every year.

Those of us who make chips have all we can do to keep up the pace. More than 90 percent of our chip sales this year will be from products that didn't even exist just five years ago.

Every day more and more applications become possible or affordable. One use that especially stands out is to lower the cost of doing computer calculations.

We all know that the costs of almost everything else have been shooting up in recent years. But suppose instead of going up, they had all been coming down since 1960 just like computer costs. That would mean you could buy a steak today for only 6¢ a pound, and a four-bedroom house for the dream price of $2,500.

Chips will make it possible for anyone who can afford a television set to buy a personal computer. As a home appliance, it will serve many roles, from accountant . . . to teacher . . . to game-player.

I know you've heard a lot about the talents of computers. Today, I'd like to focus on use of microprocessors for what's been called "distributed intelligence."

I'll explain this by comparing it to a biological system. If the computer is like the brain, than distributed intelligence is like nerve centers of the body that react to certain events on their own—like jerking a hand away from a hot stove.

We can now make products that react much the same. A task of your generation will be trying to discover all we can do with this newfound power.

The number of products using microprocessors is already increasing exponentially. Let's look at a few applications. One that's especially important to this group is measurement. When I walk into a laboratory these days, I see instruments with microprocessors all around. Chips born of science are now advancing science.

In the labs of the past, researchers like Thomas Edison or Madame Curie took days to do some experiments that can now be done in seconds. Today's experimenters can get more data of better quality and greater precision. Expectations are higher than ever for those of you who are going into the field of research.

Another area where chips are strong is controls—electronics are replacing mechanical, hydraulic and pneumatic devices everywhere.

You're all familiar with mechanical controls for appliances like washing machines and ranges. It's only going to take another year or two for electronic controls to be available for nearly all household appliances.

Chips are invading so many areas, they affect almost everything we make at UTC—from medical instruments to defense and aerospace products that gobble up chips in large quantities.

I'll discuss just one area that affects all of us directly—the automobile. UTC is a major supplier to the automotive industry. People are often surprised when they learn that our automotive divisions are part of our Electronics Group.

There's a very good reason—cars are becoming what might be called "computermobiles." Chips are finding their way into every part of the car. They'll perform many functions, including two that are vital: improving fuel economy and reducing exhaust emissions to meet increasingly high standards. I don't see how conventional engine controls could instantaneously resolve demands of two goals that so often conflict.

With chips, cars will always run their best, because electronic controls can fine tune engines 30 times every second.

Virtually every new car made in America in a few years will have electronic engine controls. In a way, this is a step backward. New autos will perform like models made before the 1970s—back in the days when there were no emission controls to rob cars of their pep. Those of us who have fond memories of past performance are absolutely delighted.

Electronic magic will work many changes on the ordinary car. Some familiar auto parts will disappear completely. The gear shift lever may go . . . the mechanical link between the accelerator pedal and the throttle . . . even carburetors may be replaced within five years by new devices aided by chips.

At the same time, electronics will conjure up many new options. We make keyless entry systems for some car models already.

In the near future, electronically-controlled suspension systems may enable small cars to ride as comfortably as big ones.

The list goes on. One automotive executive said Detroit's "mouths are watering for more microprocessors."

And they aren't the only ones. The boom in automotive electronics is just one aspect of the whole fabulous electronics business. We believe that—of all industries in the '80s—chips will grow fastest. And two other industries that depend heavily on chips—computers and communications—will be close behind.

You may have seen the major story the New York Times ran just last Tuesday on the great future of the chip business. The paper said, "The race by scientists and engineers to create ultra-small electronic circuits has become one of the most intense in the world's history."

That's certainly true. Soon no country will rank among the advanced nations unless it produces silicon chips. They'll become a basic industry, like steel or oil.

Chips are already a force in international trade. The U.S. balance of payments might be a complete disaster except for products we grow and make by high technology—and much of that technology depends on chips.

Electronics will continue to help us more and more as the number of components on each chip gets larger. The laws of physics impose certain limits, but microelectronics have a long way to go. By the end of the decade, one chip might have the equivalent of one million vacuum tubes.

Back in 1946, the first electronic digital computer was a monster with 18,000 vacuum tubes. Now we're talking about a single chip with the power of 55 of those so-called giant brains in just one-twentieth of a square inch.

That remarkable feat typifies developments now going on in the electronics revolution. Many of us can participate in the work to be done. Let me list a few areas for technical pioneering in the electronic eighties.

—First, tomorrow's chips. The professional engineering time to design a new chip averages about six man-years. We need all the qualified people we can get, and faster design methods as well.

—Second, sensors and actuators. To use an analogy with biology again, these are the sense organs and muscles that attach to microprocessor nervous systems. Too often, we develop super brains and have to put them into puny bodies. Sensor and actuator technology lags microprocessors by 10 to 15 years. Devices that attach to chips now account for most of the cost of intelligent products.

—Third, new applications. Electronics technology is outracing our ingenuity in using it.

—Fourth, programming. The electronics society needs plenty of computer programmers. But even more, we need better ways to do the job—the portion of project costs attributable to programming can be as much as 90 percent.

—The last technical challenge I'll mention is fiber optics . . . the technology of using glass fibers like wires to carry signals of light instead of electricity. It's only recently become commercially practical for transmitting information.

Fiber optics are important to electronics because light can carry so much more information than electricity—theoretically, one light beam could carry all phone calls and radio and TV programs in North America simultaneously. Fiber optics will help to carry the flood of signals generated by the new electronics. But fiber optics technology at this time is where solid state electronics was about 30 years ago.

The challenges I've mentioned deal mostly with equipment. A broader class of challenges is concerned more with human beings. Let me use the automotive industry again to provide an example.

Think of the thousands of auto repairmen at neighborhood garages and service stations across the country who have never heard of chips, much less seen them. Yet in short order they've got to be trained and equipped to work on microprocessor systems. That's a task managers in Detroit are working on right now.

A key human challenge in any business or organization will be to overcome resistance to revolutionary change. Examples of such resistance have been documented by historians of technology. In one case, people in the iron industry avoided adopting Bessemer converters for 13 years, mainly because the threat of change aroused their fears.

The Bible tells us there is "a time to keep and a time to cast away." People like you will recognize what the times require in the age of electronics.

The new technology has been part of your upbringing. You'll be more comfortable with it than those who grew up using slide rules, and who never used a cathode ray tube for anything but watching TV. Whether you develop or implement microelectronics, you'll be natural leaders of the revolution.

I urge you to be bold and imaginative. Replace the old with the new when circumstances so dictate. Think in unconventional ways. Create uses never before possible. Invent completely original technologies.

I suggest you think ahead to your 25th reunion here on campus in the year 2005. If you seize the opportunities of this century, you'll be able to stand in the 21st century and look back on a record of unparalleled accomplishment.

I wish all of you the very best for your life and work in those exciting years ahead.

II. Legislative Forces

1. Revision of the Colleges Act

   - Pressures on conformity rather than diversity of the system can be predicted.

2. Legislation Assuring Equal Access to Postsecondary Education for all Albertans

   - Some specialization of institutional functions may be expected.

5. Constitutional Reform re: Treaty Indians

   - I see no real political force strong enough to do more than affect a modest impact in the next decade.

7. Increased Student Aid

   - This factor is among the strongest forces to affect college enrolments.

8. Professions and Occupations Legislation

   - In selected areas only. Many occupations will remain as unregulated.

13. Creation of a Foundation for Research and Innovation in Education like the Alberta Heritage Medical Research Foundation

   - Let's not create our own OISE.

14. Legal Permissability of Private Educational Concerns

   - Cost effectiveness will be the basis for such private concerns to be licensed.

   - Good idea.

15. Legislation to Permit Industry to Fund Release Time for more Educational Opportunities for Workers

    - Three respondents questioned the choice of word "permit." One crossed it out and replaced it with "force."

    - There are enormous pressures from many industries to resent (?) the change. Some "lighthouse" exceptions will occur.

    - No legislation needed—or else I don't understand the statement.

16. Legislation to Provide a Guaranteed Income

    - Not a potential reality in the tradition of this province.

Further Comments Related to Legislative Forces, Round II

- Legislation in the next decade will probably emphasize employee and student rights, accountability and the role of collective bargaining legislation will come as a result of "pressure," not from the imagination of politicians.

- I expect that there will be increasing pressure for rationalization and cost effectiveness of the college system. Changes at the institutional level will come about because of the overall strictures of provincial funding.

- We already have a higher than dreamed of new impact on the college system because of the July 80 announcements re decentralization of technical and apprentice training in Alberta.

III. Political Forces

4. Direction of Postsecondary Education in the U.S. and Ontario

    - ?

    - ?

    - Later?

    - Alberta is slowly moving into a leadership role.

5. Jurisdictional Dispute over Resources between Federal and Provincial Governments

    - An argument will emerge. Economic realities will essentially come into play.

7. Dissatisfaction with Confederation

   - Alberta will be able to afford a parochial view of its growth.

15. Faculty

   - These are forces which are normal in a system which is becoming mature and, generally, stable.

   - I rate this as low impact during the next 10 years because this force already has had impact for most of the reasons given.

16. Boards of Governors

   - The issue of local vs. provincial powers in college governance and program development will become evident in the short term. Local boards will lose.

   - True (local vs. provincial control). But the impacts have already been felt.

17. Civil Servants

   - This is the logical outcome of the demand or perceived need for central control.

   - For 17-21 (Civil Servants, Taxpayers, Politicians, Labour Unions, and Community), the impacts have already been felt. Thus "Impact" has been rated low for 10 years hence.

23. Native Groups

   - Impact will take until 2000 A.D.

24. New Canadians

   - Immigration likely to be low in the 1980's.

   - Not by 1990.

25. Militant Groups

   - Which ones?

Further Comments Related to Political Forces, Round II

- I have difficulty in viewing certain areas of these Forces as "political" unless you define "political" in a very broad sense, that is, not necessarily "legislative" in nature. Perhaps a more appropriate heading for some of these would be "pressure groups." Actually, certain pressure groups may be more effective in bringing about change or college development than political forces.

NOTE: The intended distinction between Legislative and Political forces was precisely that. Legislative forces are related to actual laws passed, while political forces consist of the many pressure groups and societal movements interacting in the environment.

- Politics, more than any other influence, has a direct impact on the college system.
- You have identified an excellent spectrum of forces. In general the forces of local influence will not likely be as strong as the forces which will lead to central control and coordination.

IV. Economic Forces

1. Government Policy of Fiscal Restraint
   - "Excessive dependence on government grants . . ."—100% now!
   - This impact is already manifesting itself.
   - Re: Catch-up/Start-up moneys—Déjà vu.
2. Inflation
   - This impact is already manifesting itself.
4. Industrial Expansion
   - "Short term job-oriented training programs will be emphasized to meet immediate job market situations."*
   - "Emphasis on trade and technology to detriment of humanities and the arts."*
5. Growth in Service Sector
   - Not by 1990.
7. Cost of Education
   - "Shift to part time attendance will increase."*
8. Changing Patterns of Remuneration
   - ?

10. Private Sector Funding Increase

    - This impact is on private colleges.

11. Increased Regulation by Federal and Provincial Governments

    - ?

12. Booming Construction Industry

    - ?

Further Comments Related to Economic Forces, Round II

- I believe you have struggled with this one—. It is very difficult to separate the "Political Forces" from "Economic Forces." Furthermore, the number of "Reason for Importance" items under a single item made it difficult for me to key under "Impact," e.g. #21 and #22 (Economic Forces, Community and Industry). This was due to my difficulty in determining consistency among the number of items.

  NOTE: Reasons for Importance given in Round II were merely a compilation of all respondents' comments related to the topic and were not intended to be either consistent or definitive.

- Hard to distinguish political from economic; seems to be repetition, particularly items 4 and 6 (Industrial Expansion and Intensified Development of Resource Industry).

  NOTE: Agreed. Overlap was inevitable as the forces interact with each other. In actual fact, Resource Industry Development appears in some form for each environmental force. The question then becomes which aspects are going to be the most influential on colleges in the next decade.

V. Demographic Forces

No comments.

VI. Ecological Forces

4. Reduction in Private Transport

   - Not by 1990.

6. The Physical Location of the Colleges

- ?

Additional Comments

Round I - Unfortunately, little will be done before 1990 with regard to pollution which will have significant impact on college training patterns.

Round II - Probably true.

Further Comments Related to Ecological Forces, Round II

- I can foresee an increase in health programs—e.g. occupational health—as the economy diversifies and new environmental thrusts develop.

VII. Cultural/Societal Forces

2. Fragmentation of the Family Unit

- (Related to special programs) Colleges have done as much in these areas as they will by 1990.

4. The Value of Education

- Important but low impact in this decade.

5. Changing Role of Women

- Fait accompli.

9. Increased Public Service

- No funds.

10(f). New Freedom in a Conservative Atmosphere

- ?

10(h). - "Tendency to question traditional values will maintain a decade of great social and cultural turbulence." (underlining added)

Further Comments Related to Cultural/Societal Forces, Round II

- After going through this section, I wonder even more if the role of the college is to "lead" or "follow." Maybe it isn't an "either-or" proposition.

VIII. General Additional Comments

Round I - Colleges will be getting many mixed messages resulting from the difficulty of government, local citizens, faculty, and students to have a common understanding of what is going on around them.

Round II - As it does now.

Round I - Western society in general will undergo a turbulent shift from a mechanistic world view characterized by hierarchies and specializations toward an ecological world view characterized by networks and interdependence.

Round II - I question whether it will go this way or a more science/technology based society.

Round I - For this reason it will be a decade of considerable tension especially for colleges with inflexible administrative structures.

Round II - This is so now.

- True. High Impact.

- Yes.

Further General Comments, Round II

- Please note my comment on the previous page [not an either-or proposition for colleges to lead or follow]. Maybe it is a good overall conclusion or question.

  The college will struggle with the notion that it must be "all things to all people" and yet carve an independent path. The "name of the game" will be financial control as opposed to local autonomy.

- Inflexible administrative structure will be forced to become flexible. This is happening now. Colleges being fairly young are not steeped in tradition. Ability to change has been one of their strong points over the last decade. I am sure college administrators will be able to meet the challenges of the next decade.

- It is interesting to note that most of the forces listed are current ones. Perhaps you should try to flush out this difference, e.g. Government restraint already is a force and is having a significant impact—it will likely remain a force and therefore continue to have a significant impact. However, this is quite different from, say, the development of satellite technology which is not yet a force but will be in this decade and will have a significant impact. Unless you flush out this kind of difference you won't get much of a sense of how things are likely to be different in 1990 from what they are in 1980. Also, you should try to capture some cross impacts, because some things will happen as a result of others. At present this is not captured by the shopping list approach.

- The forces and times (?) contain elements of self contradiction, and responses which agree with these contradictory elements are rational, given the general context of the responses. A well constructed questionnaire. I enjoyed the opportunity to participate.

- I believe that colleges now see themselves as established. Rather than being young, free wheeling, amorphous, they have become more rigid, more concerned with institutional survival and thus are more structured and less sensitive to their environments, except for acquisition of public/private funds, students, and good ink in the press.

  Thus I have rated impact as 3 in many items where the force is undeniably strong—it's just that the reaction (impact) to these forces will often be minimal.

APPENDIX 8

RESPONDENTS' COMMENTS, ROUND III

SPECIFIC COMMENTS, ROUND III

2. The Intensified Development of the Resource Industry and Technological Training and Retraining

   - Impact may be beyond 10 years.

3. Inflation and Technological Training and Retraining

   - Constraint patterns cause no significant problems. Sudden variations do.

   - Vote Conservative at Federal level.

5. Increasing In-migration and Technological Training and Retraining

   - This depends upon the skill levels of the in-migrants who may already be trained.

6. A Buoyant Economy and Technological Training and Retraining

   - Full funding support in a buoyant economy allows for strong program development.

   - The capacity to sustain services in a buoyant economy despite the high inflation of unit costs.

8. Regional Expansion of the Population and Technological Training and Retraining

   - Regional expansion of the population makes the justification of diversified services easier.

9. Faculty as a Pressure Group and Technological Training and Retraining

   - Don't project status quo into future—the potential for industry to do its own training is high; unrealistic faculty demands could drive the colleges out of business.

   - Foster the managerial rights of the college.

10. A Government Policy of Fiscal Restraint and Technological Training and Retraining

   - Fiscal restraint could affect ability to expand to meet demand.

   - Colleges cannot fulfil their mandates because of limited funding.

   - Restraint appears to be selective with respect to technological training priorities.

- Restraint is with us and will remain.

- Take the same actions as those to combat inflation. Restraint just compounds the problem.

11. Industrial Expansion and Technological Training and Retraining

- Don't assume that the industry-related programs of Ontario in the 1960's will suit Alberta's needs in the 1990's.

12. Computer Technology and Technological Training and Retraining

- Computer technology also relates to industrial expansion of a different kind, requiring different skills.

- Computer technology is severely underdeveloped in the college system. Data processing, electronic information and retrieval systems, and related technical training will need major attention—and soon.

- Procure more funds to enable colleges to be leaders in the area.

13. Growth in the Service Sector and Technological Training and Retraining

- This is the fastest growing sector. College would do well to look to it in terms of their activity rather than to blindly pursue technological training, much of which may be better done in the private sector.

- The need for skilled white-collar workers has not yet been recognized by government policy to the extent that the need for trained blue-collar workers has. The balance should be redressed. One only has to read the careers sections of local newspapers to see the pressing needs.

- Be cognizant of the importance of growth in the service sector as compared with the need for professionals.

14. Government Priorities among All Sectors and Technological Training and Retraining

- Government priorities are the key since the majority of funds come from the public purse.

- The current emphasis on technology and trade may be wise now, but an infra-structure is being laid on a massive scale. Will it be needed in ten or fifteen years time? The need for white collar skills is not being adequately met, and it will last longer than the great demand for blue collar skills of the kinds now being forwarded.

15. A Different Student Population and Technological Training and Retraining

    - An aging population will affect college programs to some extent . . . but it is likely to be more important in the 1990's than the 1980's.

    - Be flexible.

GENERAL COMMENTS, ROUND III

- The study seems to have taken the direction that I thought it would: overwhelming concern with current environmental forces and very little sense of what the long-term future holds. I believe that the major environmental force of the future will be the people. In education the clients vote with their feet. If attitudes and values undergo a marked shift away from valuing what the institutions currently offer and the way they offer it, then the people will look for and find alternatives to meet their needs. As the "information revolution" intensifies during this decade, the vista of alternative possibilities to the present "closed shop" approach of our educational system will widen. The door may well be wide open by the end of the decade, though that is probably too quick of a response to expect from "conservative" Alberta.

- My sense of the policy decision area you have chosen to focus on, is that that battle will be fought in terms of how much of technology training is to be done in institutions and how much will be done in industry. There is a built-in assumption in your study that the status quo of institutional-based training will continue into the future. I think you should question that assumption.

- Questions were answered on the basis that if the environmental factor "were" to occur, what would be the level of influence on the policy decision area. For e.g. if government institutes a policy of restraint then obviously there would be a high influence on the technological training and retraining. No judgement is made as to the likelihood of the occurrence in this round.

- Note: Possible college adjustments are not ranked in order of preference, and are suggested only as possible responses, not necessarily the "probable" response.

- Note: These views neither reflect Departmental and government policy.

- Work hard to maintain a balance in our post secondary educational system so that the pendulum is not swinging too far in favor of Technological Training and Retraining. Maintain a good balance between the latter and University Transfer, Certificates and Diploma Programs.

- There is some difficulty in making a conceptual distinction in some of the identified environmental forces.

- Taking all matters into account, an interesting exercise.

- The high priority given to technological training and retraining by your respondents may reflect the numerical predominance of technically-oriented schools in your sample and perhaps government priority.

APPENDIX 9

INFORMATION ON THE ELECTRONIC INFORMATION EXCHANGE SYSTEM (EIES)

ACCESS POLICY

Electronic Information Exchange System (EIES)
at the
New Jersey Institute of Technology

The Electronic Information Exchange System (EIES) is a computerized conferencing system designed by Murray Turoff and operating at the New Jersey Institute of Technology. It uses the abilities of a computer to facilitate human communication. EIES is an integral part of the Computerized Conferencing and Communications Center. It provides a field laboratory in which individuals can experiment and utilize the most recent developments in the technology. EIES is the vehicle for establishing feedback between R&D and evaluation efforts and "real world" user communities. The Center has evolved an extensive methodology for evaluating this technology and its application, based upon more than 70,000 hours of user experience with the EIES system through September 1979.

EIES is a fixed-capacity resource which will accept a maximum of 450 Class 1 users. Preference is given first to any group interested in the evolution, evaluation, assessment and/or applications of this technology. Our concern at NJIT is with the structuring of human communications by computer technology to facilitate the objectives of cooperative groups. Therefore, groups willing to collaborate with us in allowing us to observe how they use the system, or in aiding us to develop the tools they need on such a system receive first consideration for membership. Groups interested in conducting or participating in evaluation activities, in designing and developing new software tools, or in conceptualizing new applications fall into this category.

Some of the key areas currently being explored under the NJIT research program are: Office Automation, Decision Support Systems, Public Utilization, Disadvantaged and Handicapped Applications, Scientific and Technical Information Exchange, Medical and Educational Applications. We are particularly interested in groups wishing to experiment in these areas.

The second category are groups and wish to utilize EIES who represent academic, non-profit, professional and trade associations, research activities, governmental bodies, foundations and citizen and community groups. In these cases we will monitor the group's activity data. Within this category, preference is given either to groups who represent a new and unique application or population of users, or to groups whose nature and objectives relate to or complement the existing user population.

We expect all groups to cooperate in providing us information on the degree of success they have in utilizing EIES. The method of doing this will be worked out on a case-by-case basis. No single group can obtain more than 100 membership slots on EIES and no group can be given more than a two-year initial commitment to membership. Individual memberships will be viewed within the same set of preferences.

EIES' BASIC CAPABILITIES

The basic EIES system supports electronic messaging, conferencing, personal notebooks, text editing, and document preparation. It includes a multitude of specialized features such as voting, automated questionnaires, and data-gathering to facilitate group communication processes.

EIES has five alternative human machine interfaces, from simple menus for the beginning and casual user to self-defined user commands and procedures for customized tailoring of the interface.

EIES also allows the development of specialized subsystems for specific tasks. This has been utilized in such areas as legislative information exchange, standards setting, project management, and social experimentation and forecasting. See the EIES application fact sheet for more details.

MEMBERSHIPS AND COSTS

CLASS ONE MEMBERSHIPS

These memberships entitle users to priority one service and a private conference and notebook with an allocation of 200 full-sized pages of text. For a group of memberships, the 200-page limit is considered to be an average figure per member for the entire group. When an individual member is engaged in activities of interest to other EIES members, we will continue to be selective in enforcing this limit. The cost for a Class one membership is $66 per month with no hourly charge. A free group conference and notebook comes with every group of 10 members.

CLASS TWO MEMBERSHIPS

These users do not get a private conference or notebook and can experience degradation in response time when the system is heavily loaded. Groups may purchase class two slots in a ratio of one class two slot for each three class one slots purchased. The cost of these slots is $15 per month and $1.50 per hour of use. The class two slots allocated by NJIT are primarily to allow new people to explore the system.

MULTI-USER ACCOUNTS

In these accounts many hundreds of individuals can share access to one slot for private messages with each other and with other members of the EIES system. A maximum of 10 such slots is planned, and they will largely be allocated to groups that wish to expand the results of their activities to wider readership. The members of multi-user slots will not be entered in the EIES Director, but they will be listed in a new Directory component called INTERESTS, which allows groups to self-form about topic areas. Many of these slots will be tailed to allow a group to distribute specific material to the users of these multi-membership slots. The cost of these slots is $100 a month plus $1 per hour per user.

SOFTWARE DEVELOPMENT

For those interested in developing specialized computer augmentation for their communication processes, the INTERACT programming language requires about a month's learning time for an experienced programmer. The Center has computer science students trained and willing to undertake programming at very reasonable rates. Specialized design talent in this area is also available through the Center.

EVALUATION AND HUMAN FACILITATION

A number of experienced EIES users are available on a consulting basis who have significant experience in evaluating the use of this technology and/or facilitating human communication processes.

DATA BASE APPLICATIONS

While EIES is not designed to support data base applications of a very large size, it can reasonably support text files or files that have been restructured to superimpose a data structure on text items. EIES also has an extensive indexing capability available through the INTERACT programming language. Public notebooks with thousands of entries are conceivable. EIES is particularly ideal for evolving the design of a data base system by interaction between the designers and users based on a pilot or architectural model of the system done in INTERACT. Details on the effort involved in learning and utilizing INTERACT are available on request. For those who wish a very large file, the cost per each 100 full pages is $10 per month. (A page is over 5,000 characters).

EIES FEE SUMMARY

ACCOUNT	MONTHLY RATE	HOURLY RATE
CLASS I	$66	NONE
CLASS II	$15	$1.50
MULTI-USER	$100	$1.00
OTHER FEES:		
TELENET		
MAINLAND US		$3.75
HAWAII		$6.50
CANADA*		$6.50

Use of TELENET allows connection to EIES by local phone call in more than 150 U.S. cities. Those with leased lines able to phone the EIES facility directly in Newark, New Jersey may avoid this charge.

*Cost of Telenet in other foreign countries available upon request.
For further information contact:

Anita Graziano (107)
Computerized Conferencing and Communications Center
323 High Street
Newark, New Jersey 07102
(201) 645-5211/5212

For background reading see "The Network Nation" by Starr Roxanne Hiltz and Murray Turoff, Addison Wesley Advance Book Program 1980.

MINIMIZING RED TAPE

It is our objective to minimize the cost of EIES to its users and groups. To accomplish this, we must limit paper work. Our billing policy is that monthly charges for individuals must be paid for three months at a time and in advance. Groups of more than three may pay one month in advance. Also, hourly charges must be paid before they are allocated. If Purchase Orders are used with no advance payment, there will be a $10 fee for each bill that is processed.

EIES FACT SHEET #1

AN OVERVIEW OF EIES AND ITS USERS

The Electronic Information Exchange System (EIES) at the New Jersey Institute of Technology is a computer based communications system which links together 700 people all over North America and in Europe. It is an organized communication space which provides various structures for the exchange of information. Users may send and receive messages, engage in electronic conferences or "meetings", jointly draft articles and reports, contribute to and read computer-based "journals", and design computer aids tailored to their own work.

Users say the system organizes their time better because they can send and pick up messages at their convenience. They can introduce themselves to and communicate with dozens more people than they could otherwise, and they can sift easily through masses of data on complex issues like energy or waste disposal. On-line researchers studying how people use EIES help others understand and develop the protocols of message-sending, and EIES users provide the necessary data for NJIT's research into this new form of human communication.

EIES USERS

The variety of activities carried out by the members of EIES sounds like a modern "Twelve Days of Christmas". There is one child who plays a computer based game of "Hangman". Ten experts on viral hepatitis are jointly compiling a data base on everything that is known about the diagnosis and treatment of the disease. Fourteen authors are jointly writing an article on "superliteracy" for OMNI magazine. About two dozen "futurists" are discussing the potential sources of energy in the future and the impact which reliance upon them would have on American society. Twenty five state legislative science advisors are exchanging inquiries and responses related to possible new state legislation.

The Electronic Information Exchange System has been likened to a "blooming buzzing garden" by its designer, Dr. Murray Turoff, where over 700 members in over fifty groups are working on cooperative projects. With the computer used to store and organize their communications, they are able to carry out a variety of projects despite the fact that they are located all over North America and Europe. EIES is available for participation by any group interested in exploring this new technology, at a cost of $66 a month for a membership in the system.

Among the groups which have previously used or are currently using EIES are the following (an asterisk (*) indicates that a fact sheet is available on the particular application; write to the address below to obtain the fact sheets in which you are interested).

*Viral Hepatitis: Ten experts are updating and validating a data base which synthesizes existing knowledge about this disease, for use by practitioners.

*Politechs-Legitech: Twenty-five state legislative science advisors exchange inquiries and responses about issues of legislative interest, ranging from toxic wastes to the licensing of child care centers.

*Field Trials with the Disadvantaged: Children in a cerebral palsy school and residents of a home for the aged use computerized communications to expand their intellectual and social world.

Utopian communities: Residents of utopian communities in Arizona and Scotland exchange ideas about building better human settlements.

*The White House Conference on Library and Information Services: 37 members of the national advisory committee and staff use EIES to plan a large-scale national conference.

*Joint Electron Device Engineering Council: Developing industry-wide standards for components and products.

Hudson Institute: Developing materials for seminars.

American Petroleum Institute: the Committee on Information Services, consisting of representatives of major oil companies, augments its regular meetings with continuous EIES communications.

EIES PAST AND FUTURE

Originally developed under National Science Foundation sponsorship, membership in EIES was by invitation only until the fall of 1979. Now new members are sought to join at $66 each per month. People who want to try the new technology in new ways or evaluate how well it works for them are preferred.

"Eventually, we think there will be dozens of EIES clones, around the country and abroad," says Murray Turoff, EIES designer, "all linked together, with thousands of people using this new form of communication. Meanwhile, we are opening up the existing system for people to propose whatever applications they can think of." EIES operates on mini-computer technology and is relatively inexpensive compared to the telephone and most other forms of communications.

Further information on the system and how to gain access is available from the Computerized Conferencing and Communications Center, New Jersey Institute of Technology, 323 High St., Newark, N.J., 07102; or by phoning Anita Graziano at 201-645-5211.

EIES FACT SHEET #2

THE ECONOMICS AND TECHNOLOGY OF EIES: OVERVIEW

The EIES system is operational on a dedicated mini-computer. Approximately 175,000 dollars could set up a turnkey copy of EIES to operate for a membership of about a thousand individuals. Any organization with 300 or more potential active users could cost-justify such a system by comparing alternative costs for mails and/or telephone to accomplish the same ends.

Based upon 90,000 hours of user experience, now running at about 7,000 hours per month, the throughput cost of operating EIES is about $3.00 per hour. Adding to this the current costs of TELENET (the nation wide digital packet network used by EIES) at $3.75 per hour, the effective cost of nationwide use of the EIES system is less than $7 per hour. At this rate EIES is far cheaper than long distance phone charges and traveling to meetings. In fact, the startling thing about the economics of EIES is that the current technology is cost competitive with the mail for user groups of 9 or more who wish to exchange communications as a group on a regular basis.

For a detailed economic trade-off analysis of EIES with other communication alternatives see the economics chapter in the book: The Network Nation: Human Communications via Computers by S. R. Hiltz and M. Turoff, Addison-Wesley Advanced Books, 1978. It is the pragmatics of of these cost tradeoffs that is leading to the growing interest in and use of "electronic mail". However, the concept of "electronic mail" reflects the fallacy of thinking that computerization of a function can be a mere automation of what we are doing now. However, this view disguises the potential long term impacts of these technologies upon organizations and the opportunities presented by viewing this technology as a chance to design human communication structures ideally suited to particular groups and their applications.

To accomplish the objective of optimizing the design of specific communication structures, the EIES system has two major components from a technical standpoint. In the hard code of the software system are the very general purpose functions for messages, conferences, notebooks and the underlying general purpose text file system and word processing. Coupled to this is an interpreter of a special general purpose language (INTERACT) which allows for the design of special communication structures and group computer aids in support of individuals and groups on EIES. Using this language, special capabilities can be easily developed, tested and refined by experience and feedback from the user groups. As an understanding evolves of the nature of generally desirable features these can be incorporated into the hard code to gain efficiency. Likewise, a specific group arriving at its own communication requirements can then tailor its own clone of the EIES system to provide optimum performance for its application.

As a result, EIES has been steadily evolving since it has gone on the air in 1976 and will continue to do so. To accomplish this it seeks to acquire new user groups interested in exploring this technology in a cooperative manner with the research staff of the Computerized Conferencing and Communications Center at NJIT.

EIES currently has invested in it approximately 35 person years of software development effort and about 10 person years of evaluation and assessment effort. While the current technology is tied to Perkin Elmer's INTERDATA line of minicomputer equipment, it is estimated that it could be transferred to other machines with about four person years of software work. We hope to work towards greater machine independence as we evolve a better understanding of the basic communication functions applicable to a wide variety of groups and applications.

In addition, the center is working on a number of related technical problems associated with computerized conferencing:

The ability of differing conference systems to interact in an intelligent distributed network so users on one machine can communicate with those on other machines without having to detect the fact that they are using more than one machine.

The ability of users to work on the composition of diagrams as a group.

The addition of graphics and the ability to handle special notations such as mathematics.

The use of microprocessors as personal aids to interfacing to EIES and other computer systems.

The transfer of material between computer systems utilizing a conferencing system as an intelligent transfer node.

Mini-EIES like systems based upon microprocessors.

Software language development associated with the implementation and design of conferencing systems.

In the effort of assessing this technology the center is developing methods to evaluate individual, group, organizational and societal impacts of the technology and the relationship of those impacts to the design of such systems. It is very much our view that the design of such systems are, in fact, the design of human systems and the development and use of the technology cannot be divorced from the associated human and behavioral considerations.

For further information on EIES and the work of the Computerized Conferencing and Communications Center at NJIT contact: Anita Graziano, NJIT, 323 High St., Newark, N.J., 07102, Tel: 201-645-5211.